INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern ial Application No
PCT/US 00/26935

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0064137 A	26-10-2000	NONE	
US 6035275 A	07-03-2000	EP 0922279 A	16-06-1999
		WO 9831007 A	16-07-1998
		JP 2000507021 T	06-06-2000
EP 0895396 A	03-02-1999	JP 11149297 A	02-06-1999
US 5774860 A	30-06-1998	NONE	
EP 0175503 A	26-03-1986	AU 576382 B	25-08-1988
		AU 4686585 A	13-03-1986
		CA 1239478 A	19-07-1988
		JP 61077098 A	19-04-1986
WO 9824225 A	04-06-1998	AU 5126698 A	22-06-1998
		EP 0941597 A	15-09-1999

INTERNATIONAL SEARCH REPORT

Intern .al Application No
PCT/US 00/26935

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 175 503 A (BRITISH TELECOMM) 26 March 1986 (1986-03-26) abstract	52,61
A	WO 98 24225 A (JOHNSTON ROBERT DENIS ;BRITISH TELECOMM (GB)) 4 June 1998 (1998-06-04) abstract	5

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/US 00/26935

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M3/493 H04M3/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G10L H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 00 64137 A (NABHA RANJEET) 26 October 2000 (2000-10-26) abstract; figures 2-5	1-62
X	US 6 035 275 A (AUST HARALD ET AL) 7 March 2000 (2000-03-07) abstract; figures 1-3 & EP 0 922 279 A 16 June 1999 (1999-06-16)	1-62
X	EP 0 895 396 A (TEXAS INSTRUMENTS INC) 3 February 1999 (1999-02-03) abstract; figure 1	1-62
X	US 5 774 860 A (BAYYA ARUNA ET AL) 30 June 1998 (1998-06-30) abstract; figure 1	1-62
	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 December 2000	29/12/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Quélavoine, R

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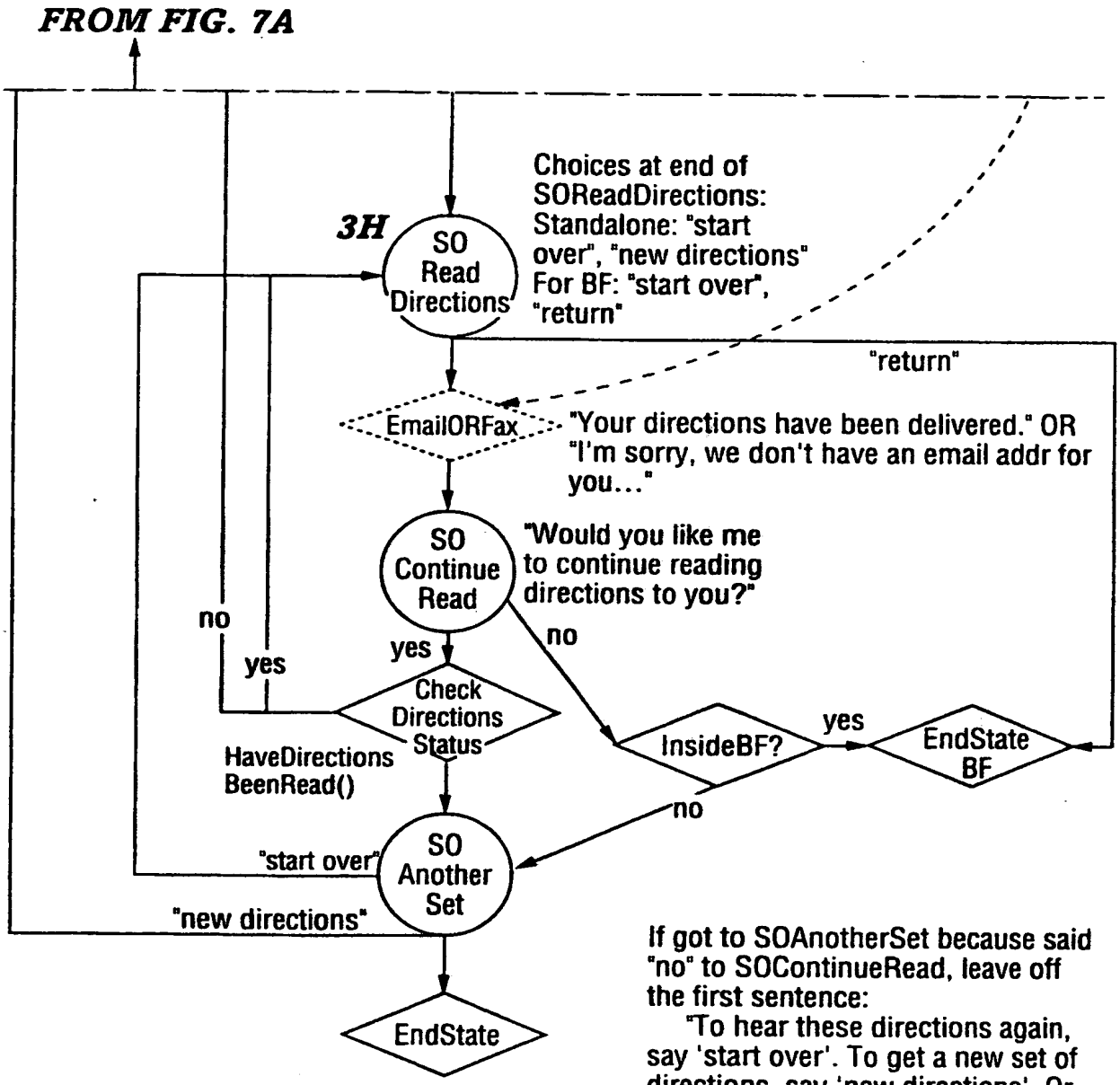

FROM FIG. 7A
3H
SO Read Directions
Choices at end of SOReadDirections: Standalone: "start over", "new directions" For BF: "start over", "return"
"return"
EmailORFax
"Your directions have been delivered." OR "I'm sorry, we don't have an email addr for you..."
SO Continue Read
"Would you like me to continue reading directions to you?"
no
yes
yes
no
Check Directions Status
HaveDirections BeenRead()
InsideBF?
yes
EndState BF
no
SO Another Set
"start over"
"new directions"
EndState
If got to SOAnotherSet because said "no" to SOContinueRead, leave off the first sentence:
"To hear these directions again, say 'start over'. To get a new set of directions, say 'new directions'. Or name another BV service."

FIG. 7B

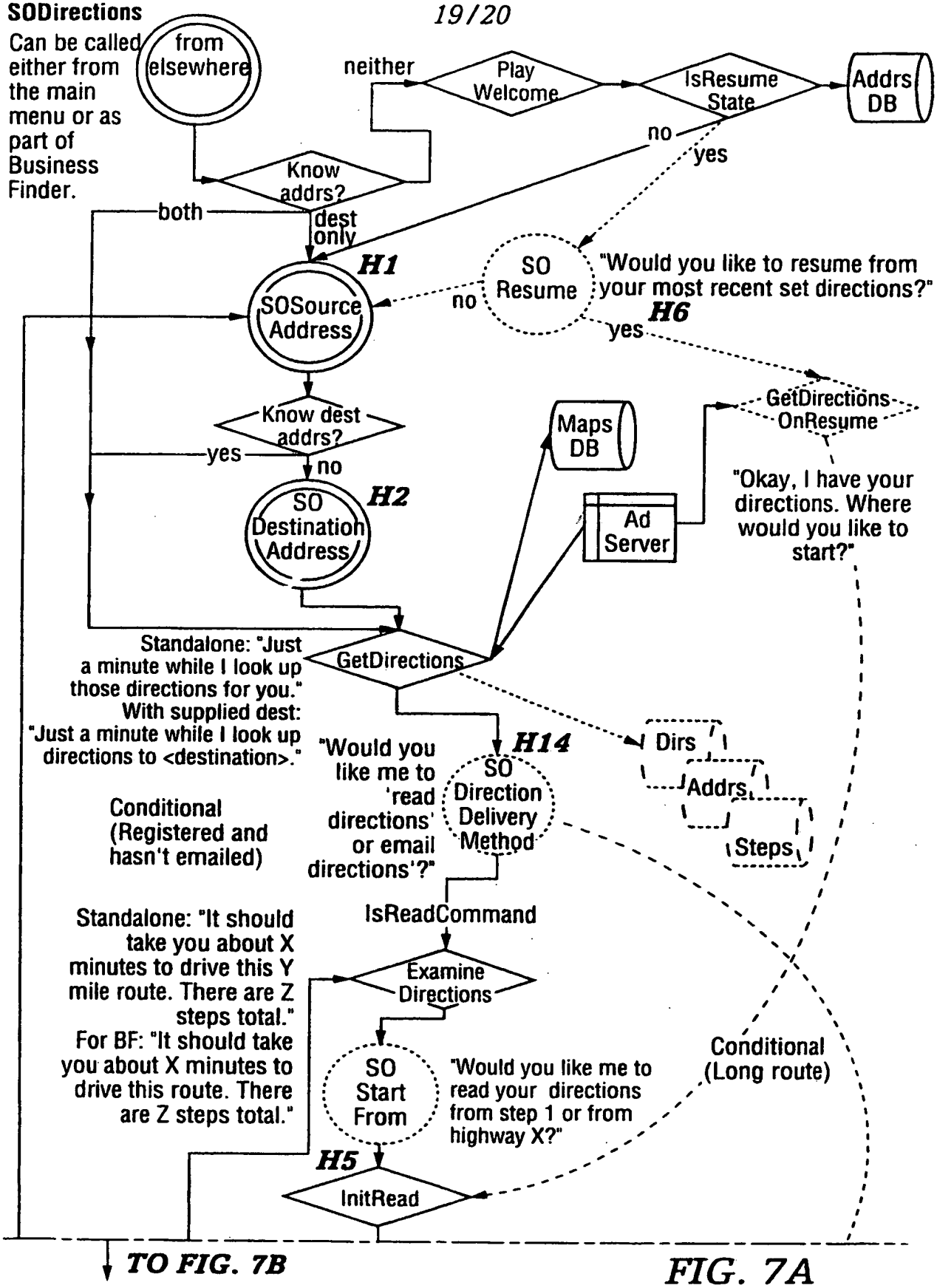

SODirections
Can be called either from the main menu or as part of Business Finder.
from elsewhere
neither
Play Welcome
IsResume State
Addrs DB
no
yes
Know addrs?
both
dest only
H1
SOSource Address
SO Resume
"Would you like to resume from your most recent set directions?"
no
H6
yes
GetDirections OnResume
Know dest addrs?
yes
no
Maps DB
H2
SO Destination Address
Ad Server
"Okay, I have your directions. Where would you like to start?"
Standalone: "Just a minute while I look up those directions for you."
With supplied dest:
"Just a minute while I look up directions to <destination>."
GetDirections
Dirs
Addrs
Steps
H14
"Would you like me to 'read directions' or email directions'?"
SO Direction Delivery Method
Conditional (Registered and hasn't emailed)
IsReadCommand
Standalone: "It should take you about X minutes to drive this Y mile route. There are Z steps total."
For BF: "It should take you about X minutes to drive this route. There are Z steps total."
Examine Directions
SO Start From
"Would you like me to read your directions from step 1 or from highway X?"
Conditional (Long route)
H5
InitRead
TO FIG. 7B

FIG. 7A

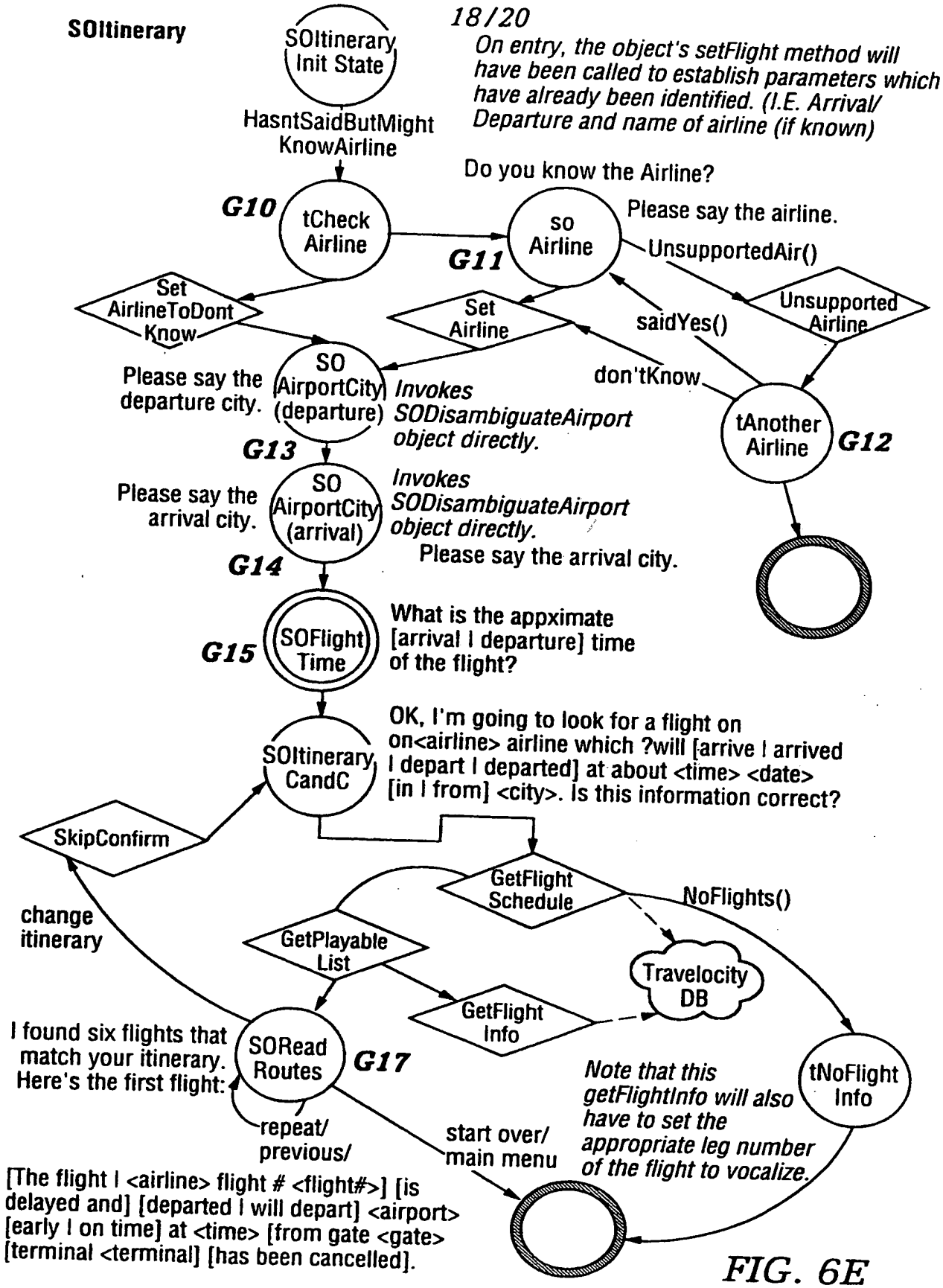

SOItinerary
18/20
On entry, the object's setFlight method will have been called to establish parameters which have already been identified. (I.E. Arrival/ Departure and name of airline (if known)
SOItinerary Init State
HasntSaidButMight KnowAirline
Do you know the Airline?
G10
tCheck Airline
so Airline
Please say the airline.
G11
UnsupportedAir()
Set AirlineToDont Know
Set Airline
saidYes()
Unsupported Airline
Please say the departure city.
SO AirportCity (departure)
Invokes SODisambiguateAirport object directly.
don'tKnow
tAnother Airline
G12
G13
Please say the arrival city.
SO AirportCity (arrival)
Invokes SODisambiguateAirport object directly.
Please say the arrival city.
G14
G15
SOFlight Time
What is the appximate [arrival I departure] time of the flight?
SOItinerary CandC
OK, I'm going to look for a flight on on<airline> airline which ?will [arrive I arrived I depart I departed] at about <time> <date> [in I from] <city>. Is this information correct?
SkipConfirm
GetFlight Schedule
NoFlights()
change itinerary
GetPlayable List
Travelocity DB
GetFlight Info
I found six flights that match your itinerary. Here's the first flight:
SORead Routes
G17
Note that this getFlightInfo will also have to set the appropriate leg number of the flight to vocalize.
tNoFlight Info
repeat/ previous/
start over/ main menu
[The flight I <airline> flight # <flight#>] [is delayed and] [departed I will depart] <airport> [early I on time] at <time> [from gate <gate> [terminal <terminal] [has been cancelled].

FIG. 6E

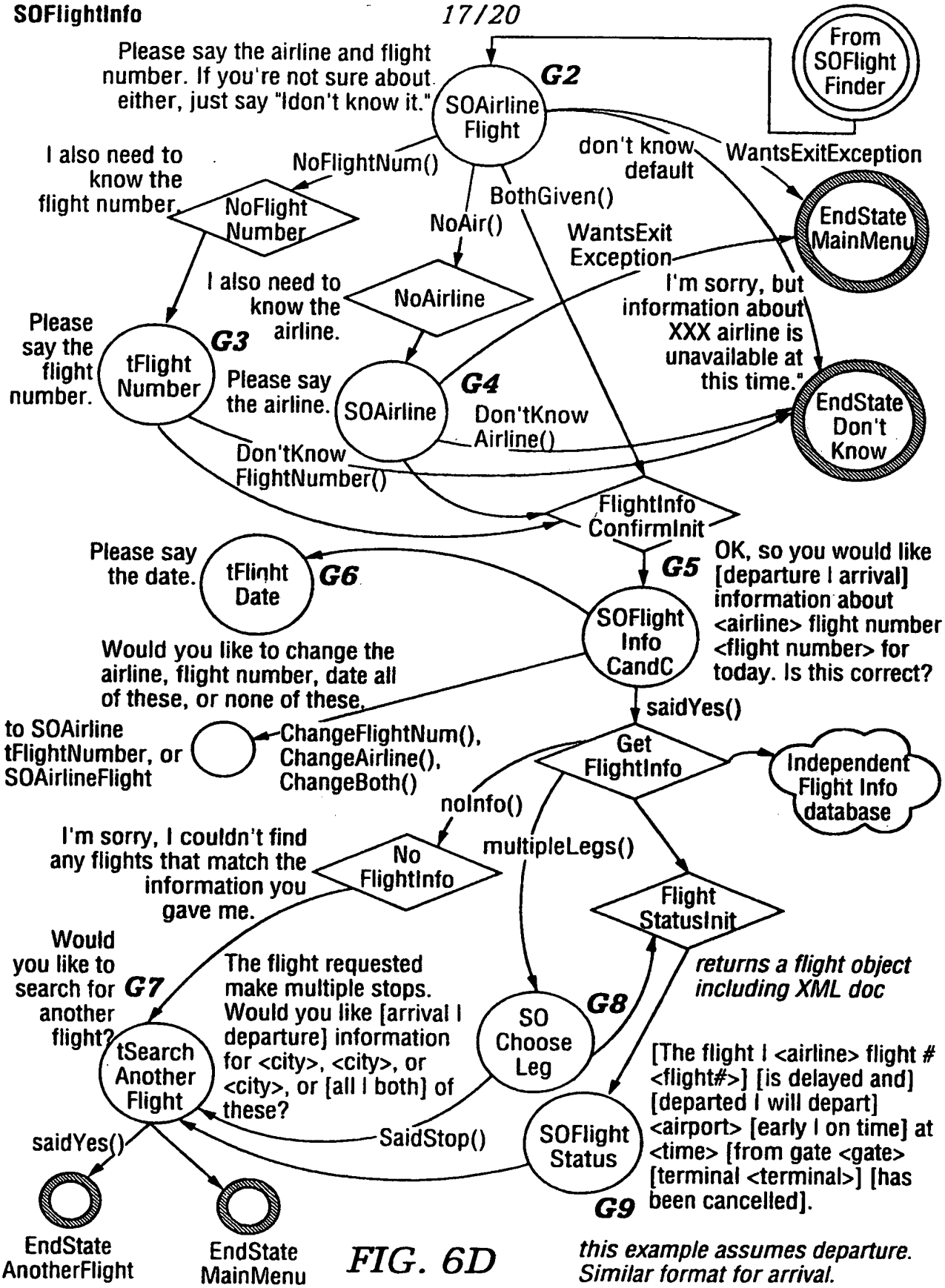

SOFlightInfo
From SOFlight Finder
Please say the airline and flight number. If you're not sure about either, just say "Idon't know it."
G2
SOAirline Flight
NoFlightNum()
I also need to know the flight number.
NoFlight Number
BothGiven()
don't know default
WantsExitException
EndState MainMenu
NoAir()
WantsExit Exception
I also need to know the airline.
NoAirline
I'm sorry, but information about XXX airline is unavailable at this time."
Please say the flight number.
tFlight Number
G3
Please say the airline.
SOAirline
G4
Don'tKnow Airline()
EndState Don't Know
Don'tKnow FlightNumber()
FlightInfo ConfirmInit
Please say the date.
tFlight Date
G6
G5
OK, so you would like [departure I arrival] information about <airline> flight number <flight number> for today. Is this correct?
SOFlight Info CandC
Would you like to change the airline, flight number, date all of these, or none of these,
saidYes()
to SOAirline tFlightNumber, or SOAirlineFlight
ChangeFlightNum(), ChangeAirline(), ChangeBoth()
Get FlightInfo
Independent Flight Info database
noInfo()
I'm sorry, I couldn't find any flights that match the information you gave me.
No FlightInfo
multipleLegs()
Flight StatusInit
returns a flight object including XML doc
Would you like to search for another flight?
G7
tSearch Another Flight
The flight requested make multiple stops. Would you like [arrival I departure] information for <city>, <city>, or <city>, or [all I both] of these?
SO Choose Leg
G8
SaidStop()
SOFlight Status
[The flight I <airline> flight # <flight#>] [is delayed and] [departed I will depart] <airport> [early I on time] at <time> [from gate <gate> [terminal <terminal>] [has been cancelled].
G9
saidYes()
EndState AnotherFlight
EndState MainMenu
this example assumes departure. Similar format for arrival.

FIG. 6D

SOFlightFinder

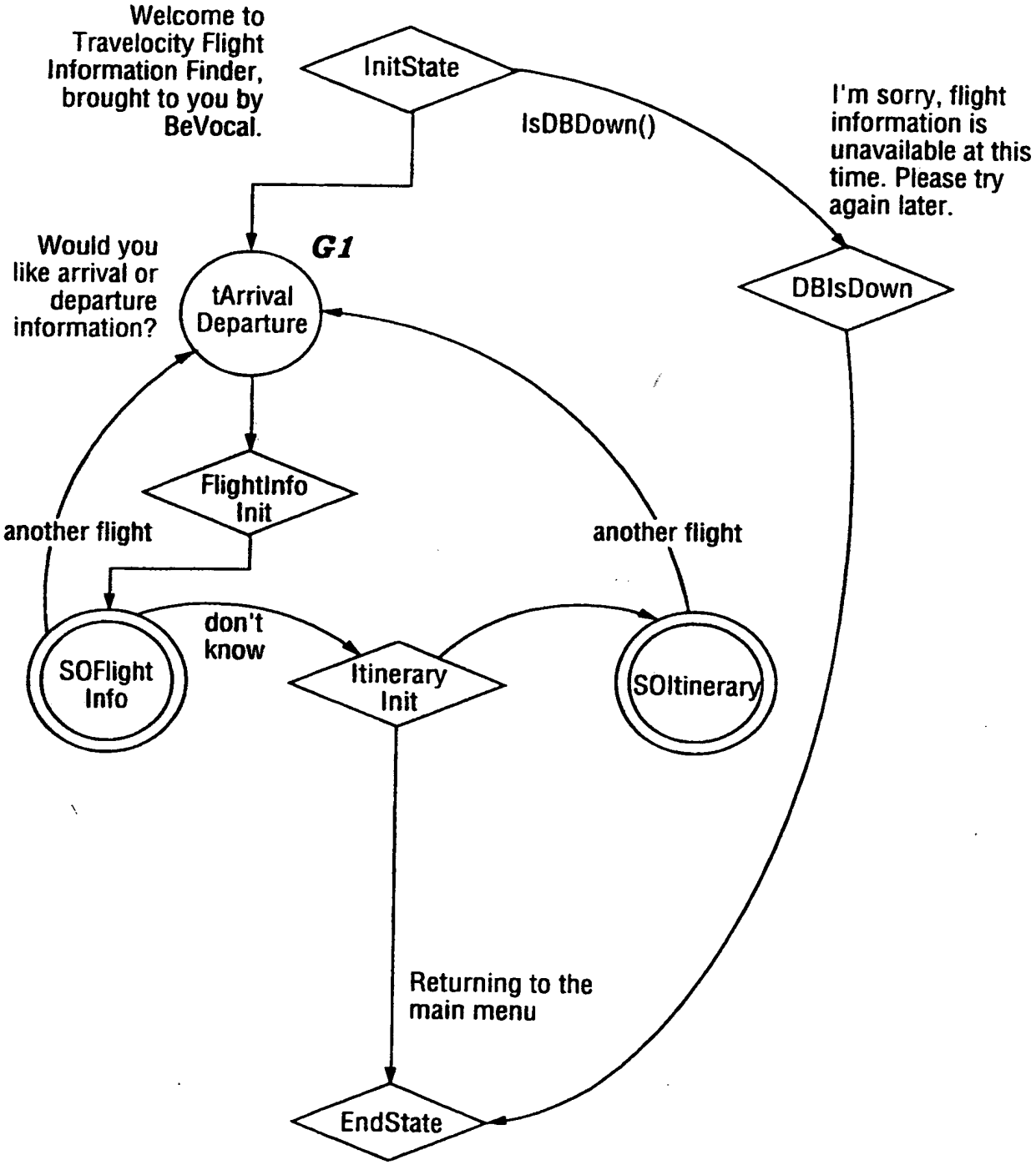


FIG. 6C

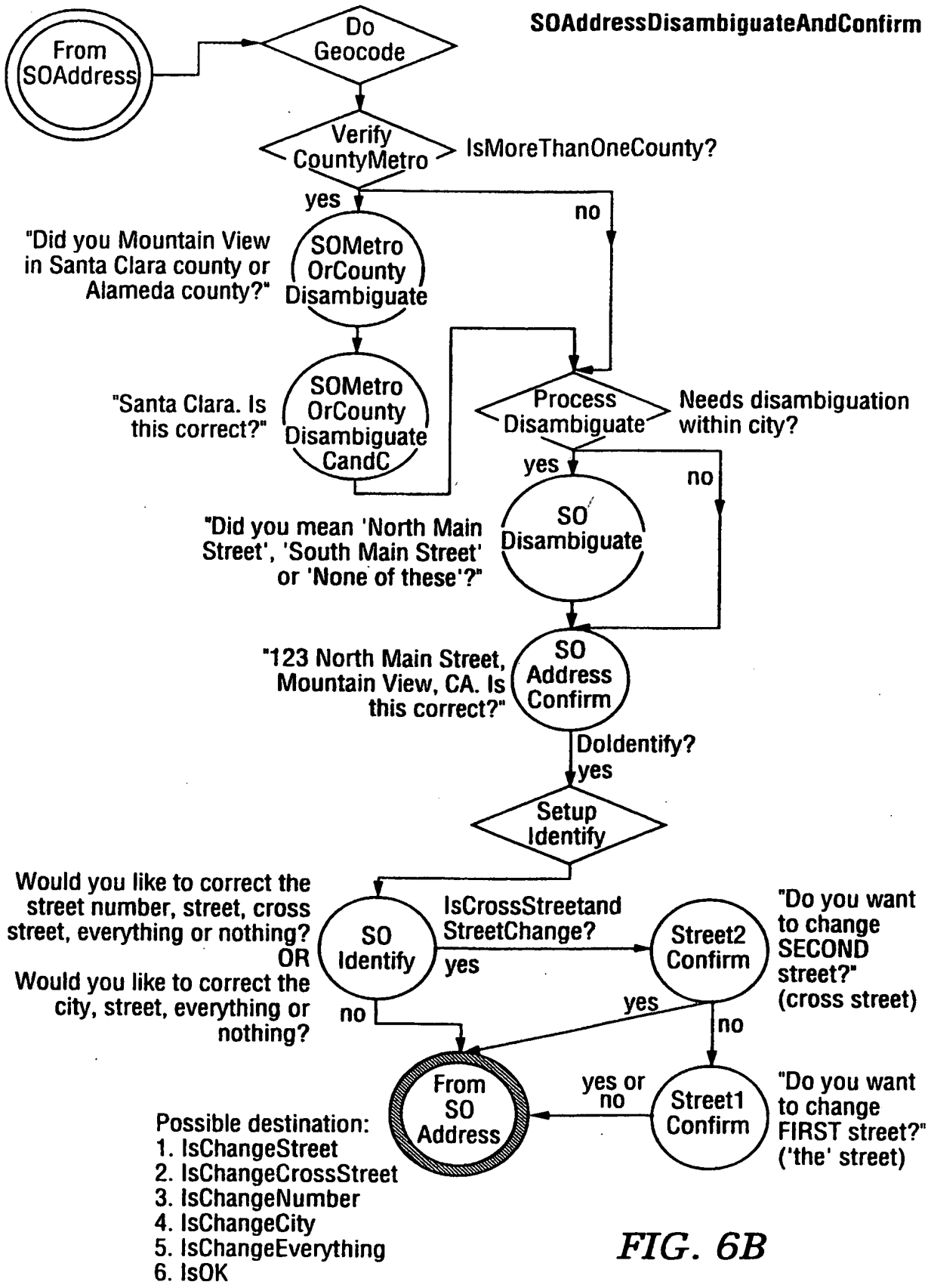

SOAddressDisambiguateAndConfirm
From SOAddress
Do Geocode
Verify CountyMetro
IsMoreThanOneCounty?
yes
no
"Did you Mountain View in Santa Clara county or Alameda county?"
SOMetro OrCounty Disambiguate
"Santa Clara. Is this correct?"
SOMetro OrCounty Disambiguate CandC
Process Disambiguate
Needs disambiguation within city?
yes
no
"Did you mean 'North Main Street', 'South Main Street' or 'None of these'?"
SO Disambiguate
"123 North Main Street, Mountain View, CA. Is this correct?"
SO Address Confirm
DoIdentify?
yes
Setup Identify
Would you like to correct the street number, street, cross street, everything or nothing? OR Would you like to correct the city, street, everything or nothing?
SO Identify
IsCrossStreetand StreetChange?
yes
Street2 Confirm
"Do you want to change SECOND street?" (cross street)
yes
no
no
From SO Address
yes or no
Street1 Confirm
"Do you want to change FIRST street?" ('the' street)
Possible destination:
1. IsChangeStreet
2. IsChangeCrossStreet
3. IsChangeNumber
4. IsChangeCity
5. IsChangeEverything
6. IsOK

FIG. 6B

SOAddress

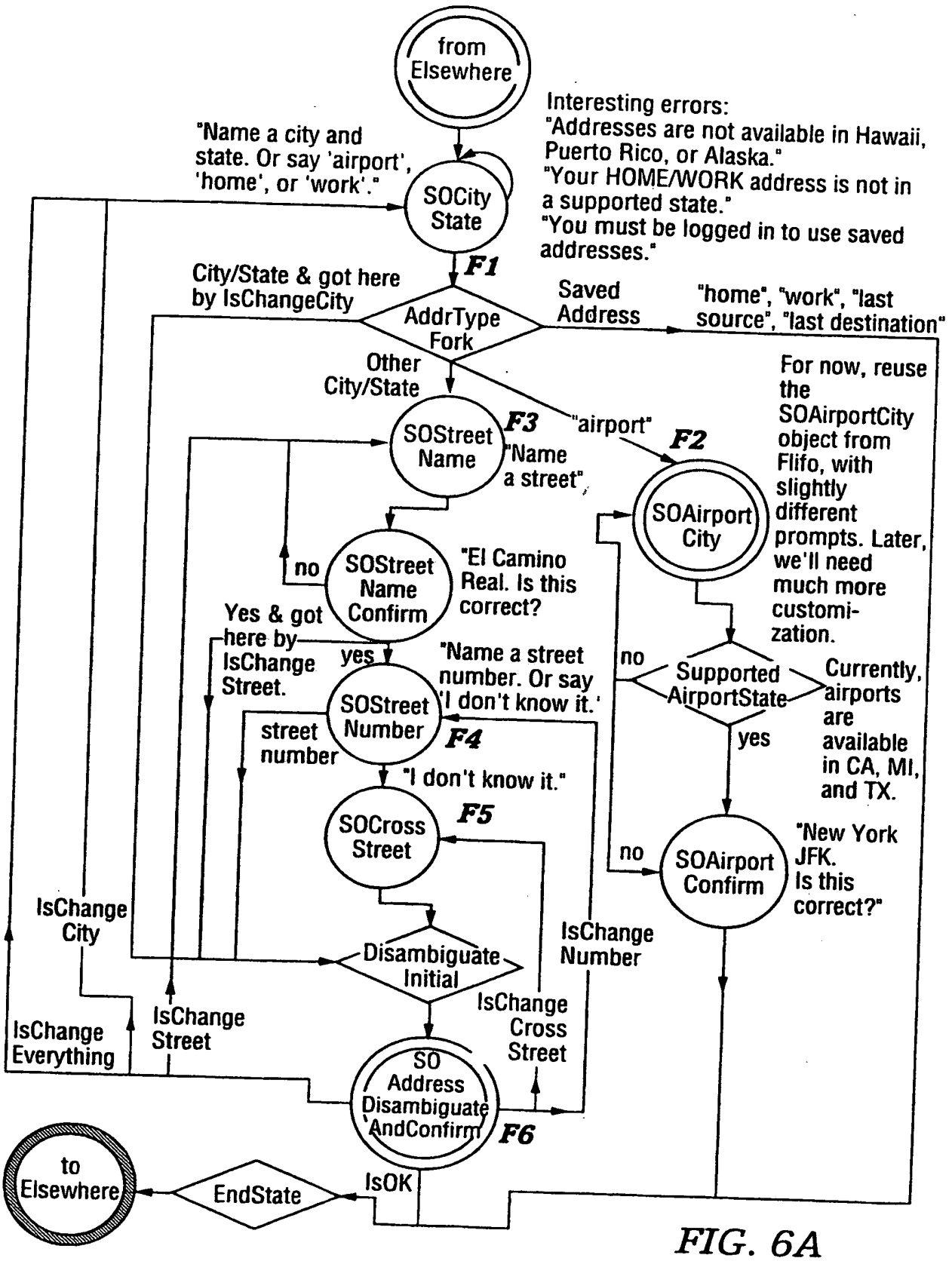


FIG. 6A

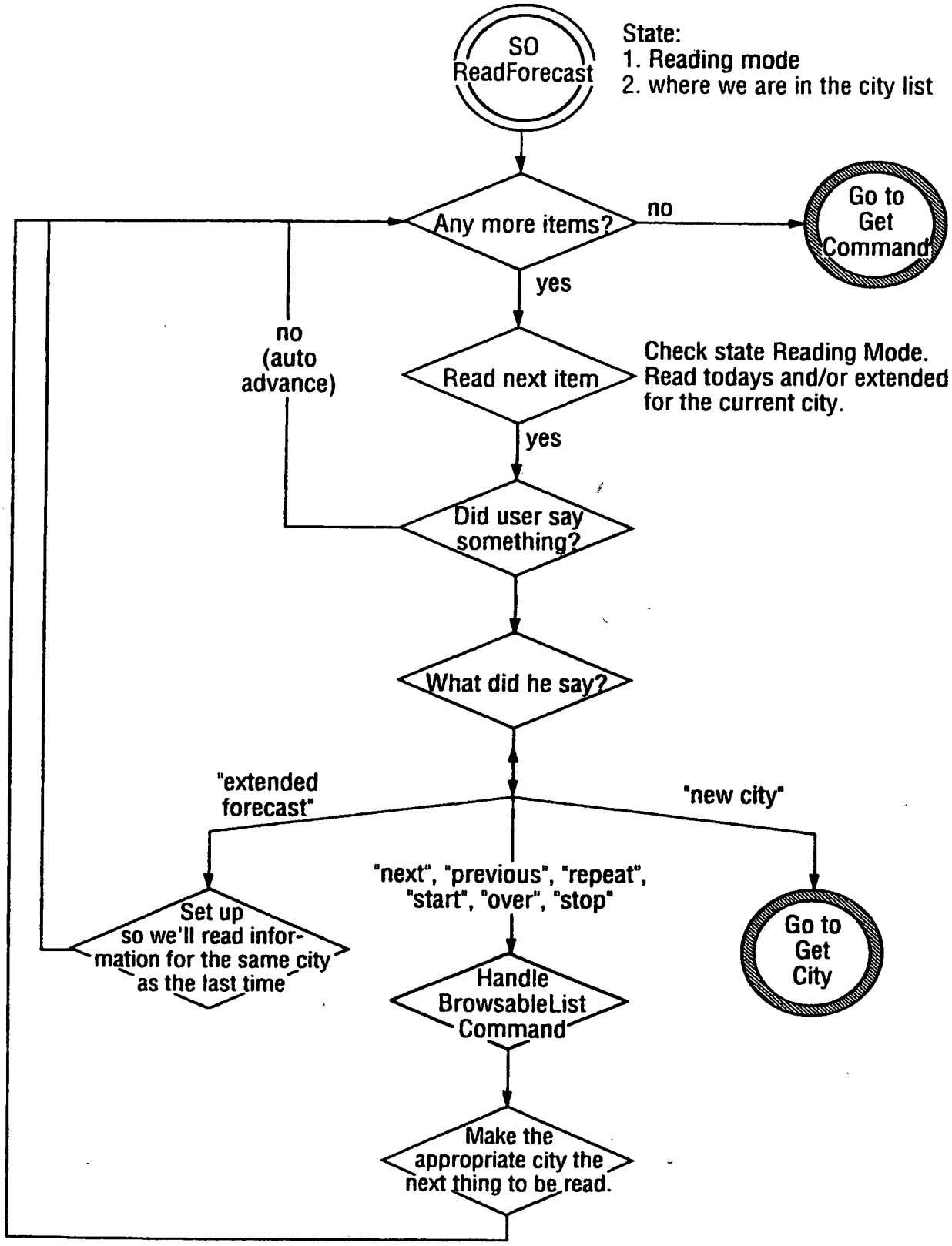

SO
ReadForecast
State:
1. Reading mode
2. where we are in the city list
Any more items?
no
Go to
Get
Command
yes
no
(auto
advance)
Read next item
Check state Reading Mode.
Read todays and/or extended
for the current city.
yes
Did user say
something?
What did he say?
"extended
forecast"
"new city"
"next", "previous", "repeat",
"start", "over", "stop"
Set up
so we'll read infor-
mation for the same city
as the last time
Handle
BrowsableList
Command
Go to
Get
City
Make the
appropriate city the
next thing to be read.

FIG. 5B

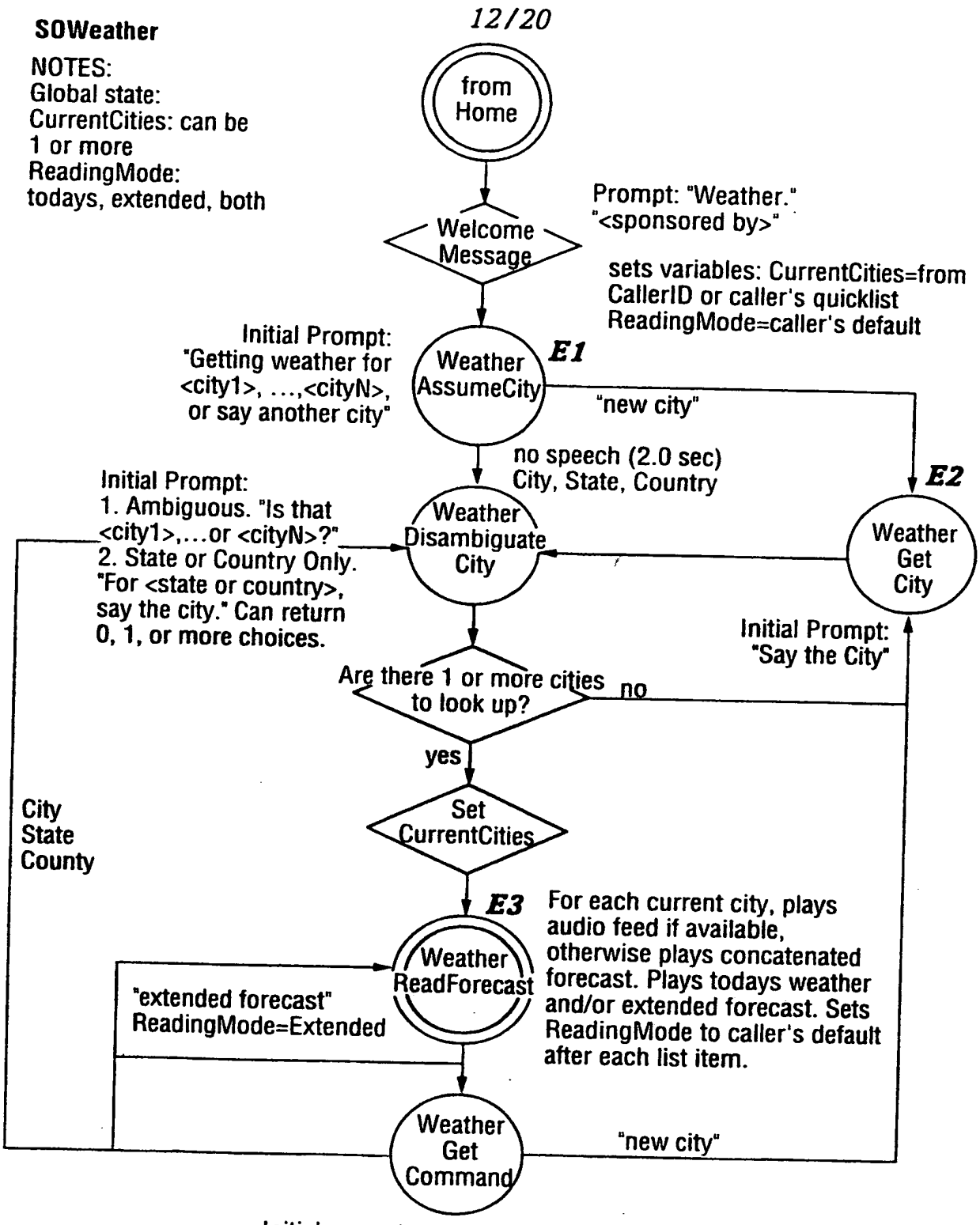

SOWeather
NOTES:
Global state:
CurrentCities: can be 1 or more
ReadingMode: todays, extended, both
from Home
Welcome Message
Prompt: "Weather." "<sponsored by>"
sets variables: CurrentCities=from CallerID or caller's quicklist
ReadingMode=caller's default
Initial Prompt: "Getting weather for <city1>, ...,<cityN>, or say another city"
Weather AssumeCity
E1
"new city"
no speech (2.0 sec)
City, State, Country
E2
Initial Prompt:
1. Ambiguous. "Is that <city1>,...or <cityN>?"
2. State or Country Only. "For <state or country>, say the city." Can return 0, 1, or more choices.
Weather Disambiguate City
Weather Get City
Initial Prompt: "Say the City"
Are there 1 or more cities to look up?
no
yes
City
State
County
Set CurrentCities
E3
Weather ReadForecast
For each current city, plays audio feed if available, otherwise plays concatenated forecast. Plays todays weather and/or extended forecast. Sets ReadingMode to caller's default after each list item.
"extended forecast" ReadingMode=Extended
Weather Get Command
"new city"
Initial prompt:
1. Just read todays weather: "Say extended forecast, or say another city."
2. Just read extended forecast: "Say another city."

FIG. 5A

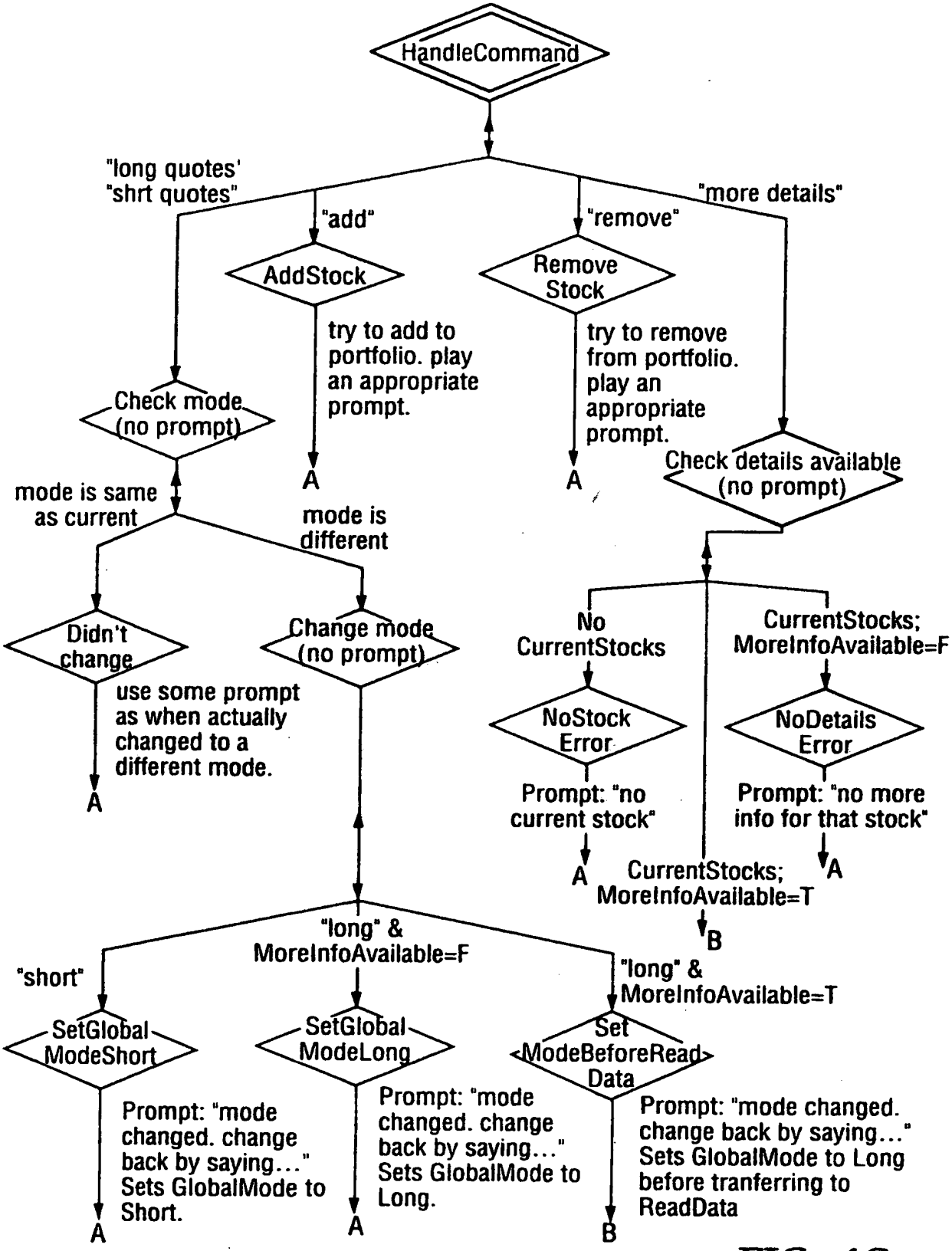

HandleCommand
"long quotes'
"shrt quotes"
"add"
"remove"
"more details"
AddStock
Remove Stock
try to add to portfolio. play an appropriate prompt.
try to remove from portfolio. play an appropriate prompt.
Check mode (no prompt)
Check details available (no prompt)
A
A
mode is same as current
mode is different
Didn't change
Change mode (no prompt)
use some prompt as when actually changed to a different mode.
A
No CurrentStocks
CurrentStocks; MoreInfoAvailable=F
NoStock Error
NoDetails Error
Prompt: "no current stock"
Prompt: "no more info for that stock"
A
A
CurrentStocks; MoreInfoAvailable=T
B
"short"
"long" & MoreInfoAvailable=F
"long" & MoreInfoAvailable=T
SetGlobal ModeShort
SetGlobal ModeLong
Set ModeBeforeRead Data
Prompt: "mode changed. change back by saying..." Sets GlobalMode to Short.
Prompt: "mode changed. change back by saying..." Sets GlobalMode to Long.
Prompt: "mode changed. change back by saying..." Sets GlobalMode to Long before tranferring to ReadData
A
A
B

FIG. 4C

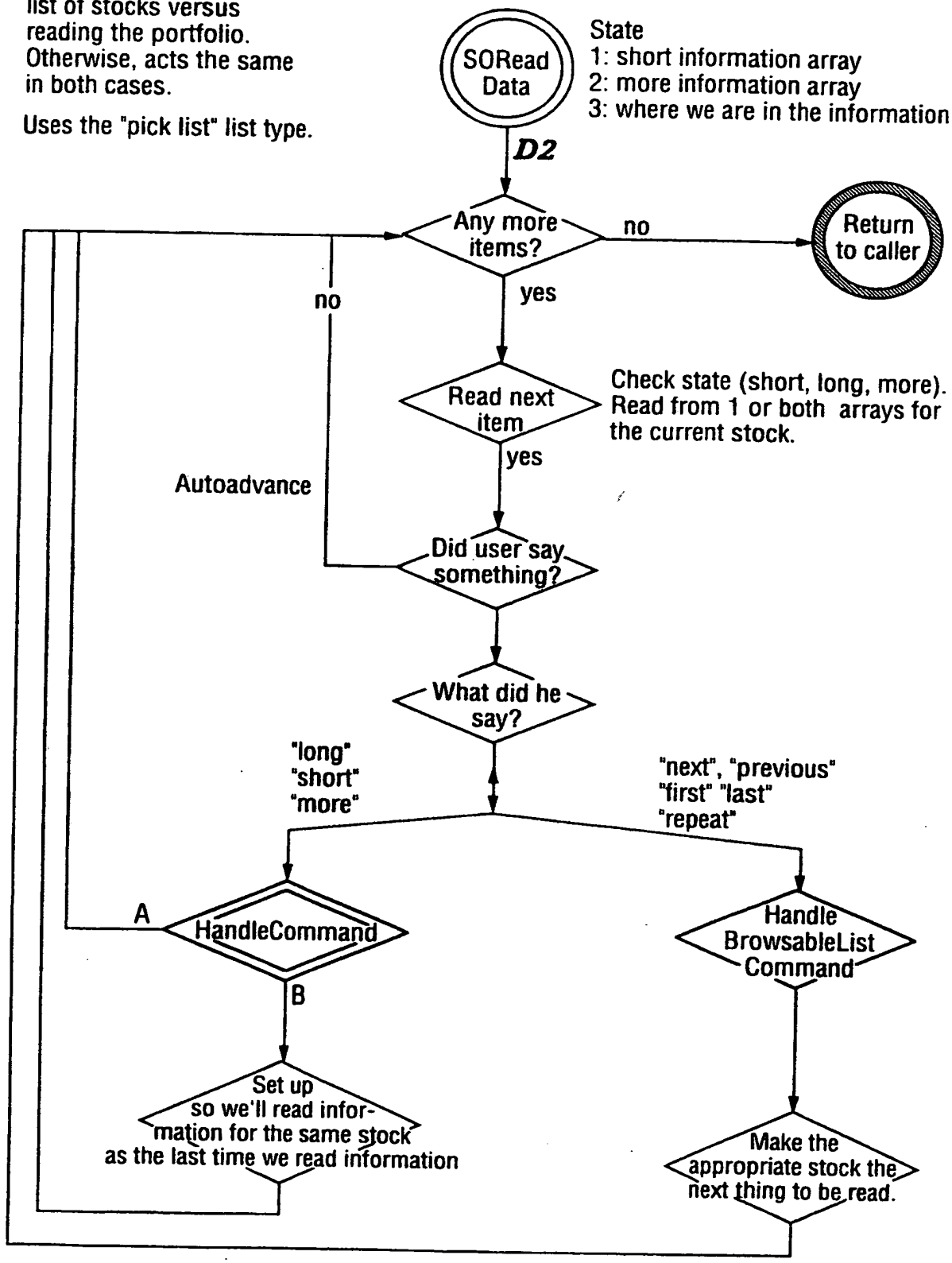

Different initial prompt if we're reading a random list of stocks versus reading the portfolio. Otherwise, acts the same in both cases.
Uses the "pick list" list type.
SORead Data
State
1: short information array
2: more information array
3: where we are in the information
D2
Any more items?
no
Return to caller
yes
no
Read next item
Check state (short, long, more). Read from 1 or both arrays for the current stock.
yes
Autoadvance
Did user say something?
What did he say?
"long"
"short"
"more"
"next", "previous"
"first" "last"
"repeat"
A
HandleCommand
B
Handle BrowsableList Command
Set up so we'll read information for the same stock as the last time we read information
Make the appropriate stock the next thing to be read.

FIG. 4B

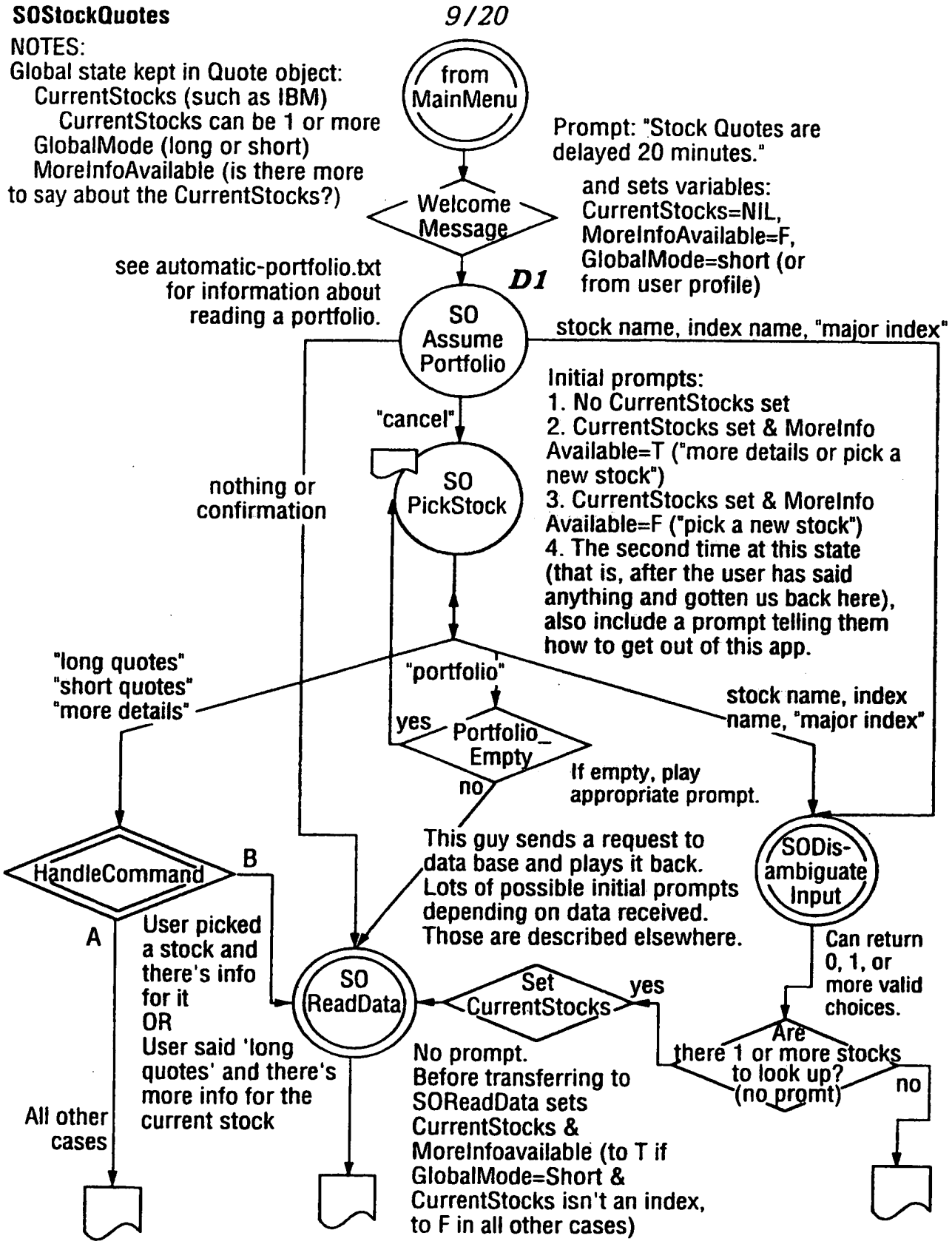

SOStockQuotes
NOTES:
Global state kept in Quote object:
CurrentStocks (such as IBM)
CurrentStocks can be 1 or more
GlobalMode (long or short)
MoreInfoAvailable (is there more to say about the CurrentStocks?)
from MainMenu
Welcome Message
Prompt: "Stock Quotes are delayed 20 minutes."
and sets variables: CurrentStocks=NIL, MoreInfoAvailable=F, GlobalMode=short (or from user profile)
see automatic-portfolio.txt for information about reading a portfolio.
D1
SO Assume Portfolio
stock name, index name, "major index"
"cancel"
SO PickStock
nothing or confirmation
Initial prompts:
1. No CurrentStocks set
2. CurrentStocks set & MoreInfo Available=T ("more details or pick a new stock")
3. CurrentStocks set & MoreInfo Available=F ("pick a new stock")
4. The second time at this state (that is, after the user has said anything and gotten us back here), also include a prompt telling them how to get out of this app.
"long quotes"
"short quotes"
"more details"
"portfolio"
yes
Portfolio_ Empty
no
If empty, play appropriate prompt.
stock name, index name, "major index"
HandleCommand
B
A
User picked a stock and there's info for it
OR
User said 'long quotes' and there's more info for the current stock
All other cases
This guy sends a request to data base and plays it back. Lots of possible initial prompts depending on data received. Those are described elsewhere.
SODis-ambiguate Input
Can return 0, 1, or more valid choices.
SO ReadData
Set CurrentStocks
yes
Are there 1 or more stocks to look up? (no promt)
no
No prompt.
Before transferring to SOReadData sets CurrentStocks & MoreInfoavailable (to T if GlobalMode=Short & CurrentStocks isn't an index, to F in all other cases)

FIG. 4A

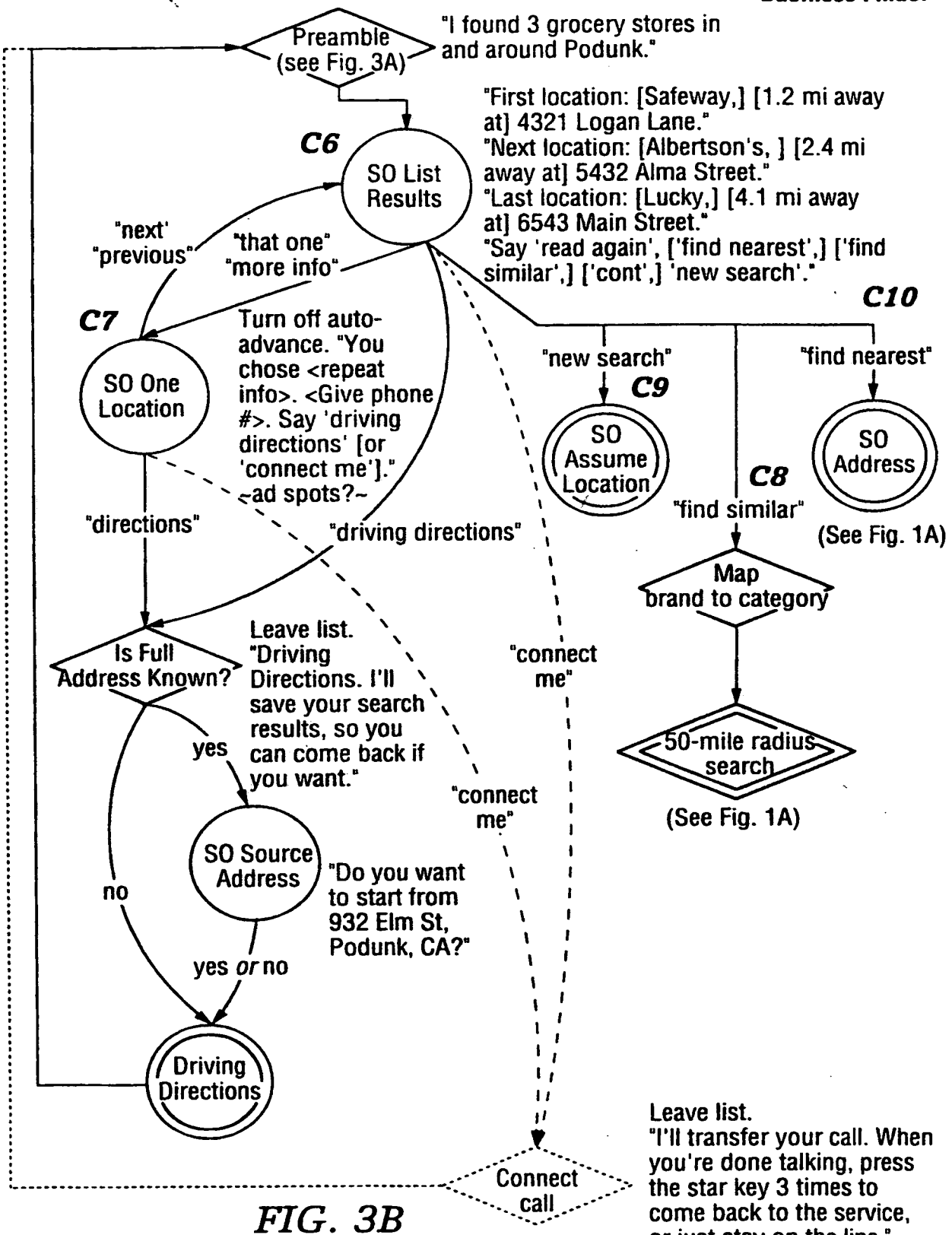

Business Finder
Preamble (see Fig. 3A)
"I found 3 grocery stores in and around Podunk."
C6
SO List Results
"First location: [Safeway,] [1.2 mi away at] 4321 Logan Lane."
"Next location: [Albertson's,] [2.4 mi away at] 5432 Alma Street."
"Last location: [Lucky,] [4.1 mi away at] 6543 Main Street."
"Say 'read again', ['find nearest',] ['find similar',] ['cont',] 'new search'."
"next" "previous"
"that one" "more info"
C7
SO One Location
Turn off auto-advance. "You chose <repeat info>. <Give phone #>. Say 'driving directions' [or 'connect me']." <ad spots?>
C10
"new search"
C9
SO Assume Location
"find nearest"
SO Address
(See Fig. 1A)
C8
"find similar"
"directions"
"driving directions"
Map brand to category
Is Full Address Known?
Leave list. "Driving Directions. I'll save your search results, so you can come back if you want."
"connect me"
yes
50-mile radius search
(See Fig. 1A)
"connect me"
SO Source Address
"Do you want to start from 932 Elm St, Podunk, CA?"
no
yes or no
Driving Directions
Connect call
Leave list. "I'll transfer your call. When you're done talking, press the star key 3 times to come back to the service, or just stay on the line."

FIG. 3B

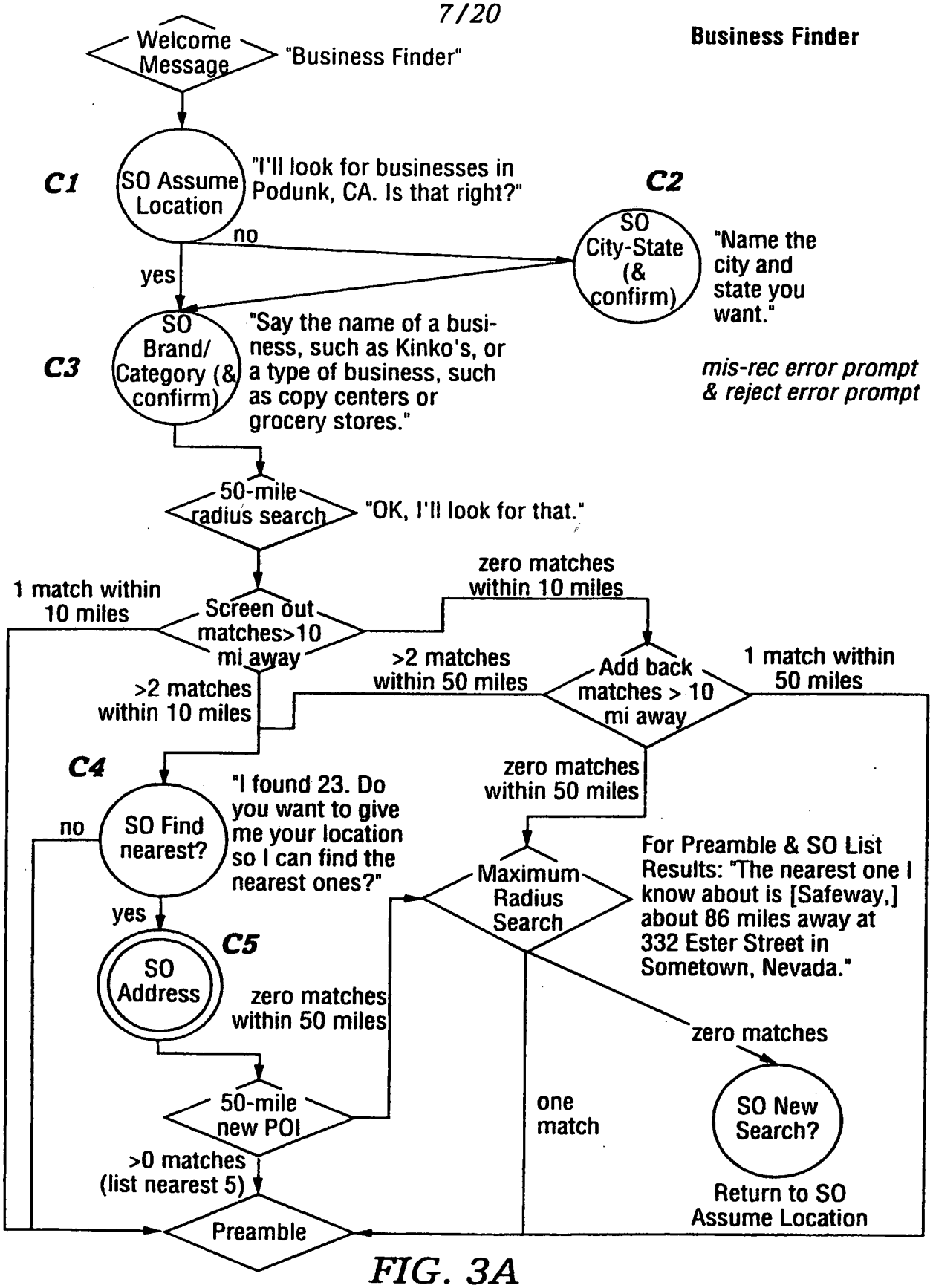
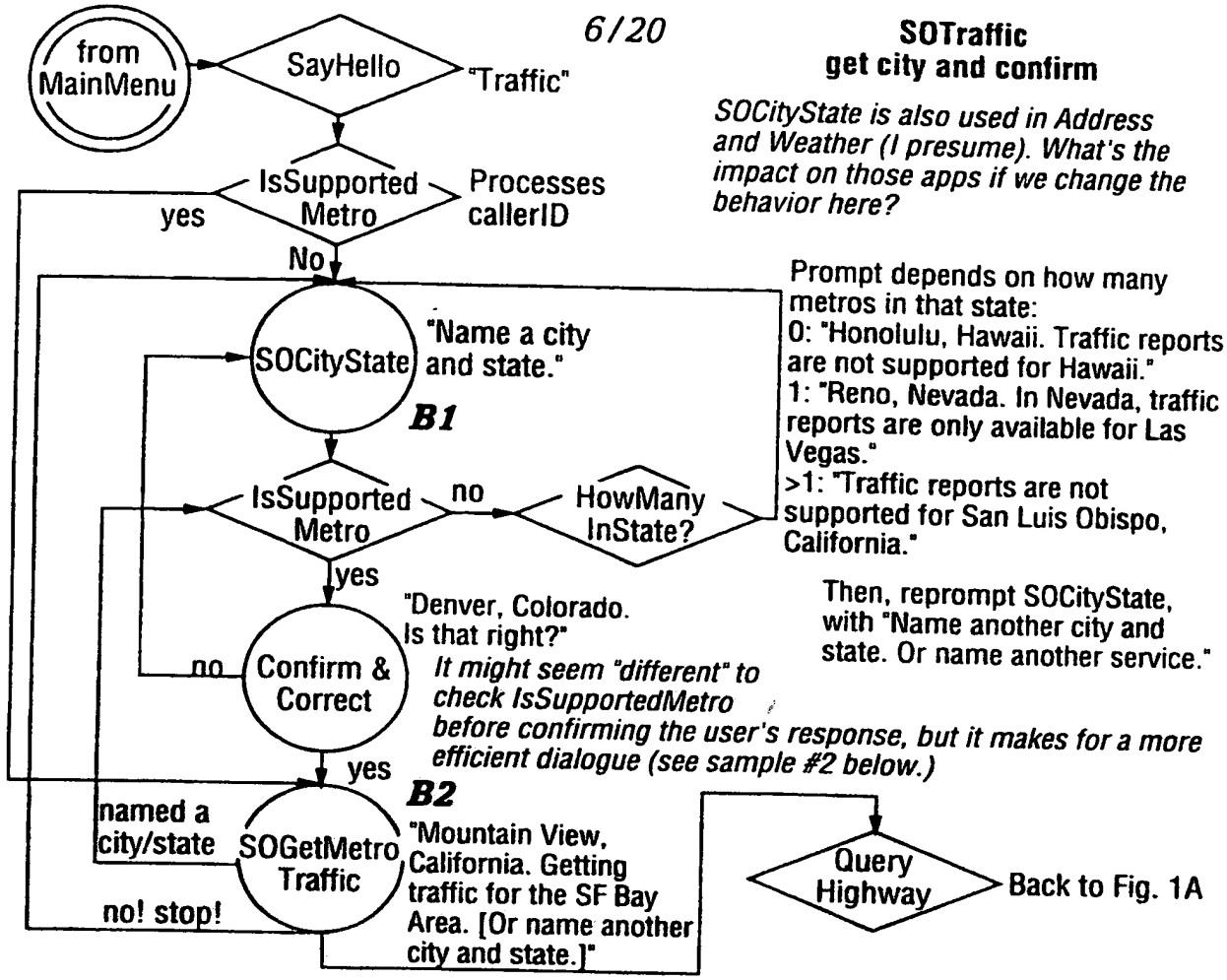

Business Finder
Welcome Message
"Business Finder"
C1
SO Assume Location
"I'll look for businesses in Podunk, CA. Is that right?"
no
yes
C2
SO City-State (& confirm)
"Name the city and state you want."
C3
SO Brand/ Category (& confirm)
"Say the name of a business, such as Kinko's, or a type of business, such as copy centers or grocery stores."
mis-rec error prompt & reject error prompt
50-mile radius search
"OK, I'll look for that."
1 match within 10 miles
Screen out matches>10 mi away
zero matches within 10 miles
>2 matches within 10 miles
>2 matches within 50 miles
Add back matches > 10 mi away
1 match within 50 miles
C4
zero matches within 50 miles
no
SO Find nearest?
"I found 23. Do you want to give me your location so I can find the nearest ones?"
yes
C5
SO Address
zero matches within 50 miles
Maximum Radius Search
For Preamble & SO List Results: "The nearest one I know about is [Safeway,] about 86 miles away at 332 Ester Street in Sometown, Nevada."
zero matches
50-mile new POI
one match
SO New Search?
>0 matches (list nearest 5)
Return to SO Assume Location
Preamble

FIG. 3A



SOTraffic
get city and confirm

SOCityState is also used in Address and Weather (I presume). What's the impact on those apps if we change the behavior here?

Prompt depends on how many metros in that state:
0: "Honolulu, Hawaii. Traffic reports are not supported for Hawaii."
1: "Reno, Nevada. In Nevada, traffic reports are only available for Las Vegas."
>1: "Traffic reports are not supported for San Luis Obispo, California."

Then, reprompt SOCityState, with "Name another city and state. Or name another service."

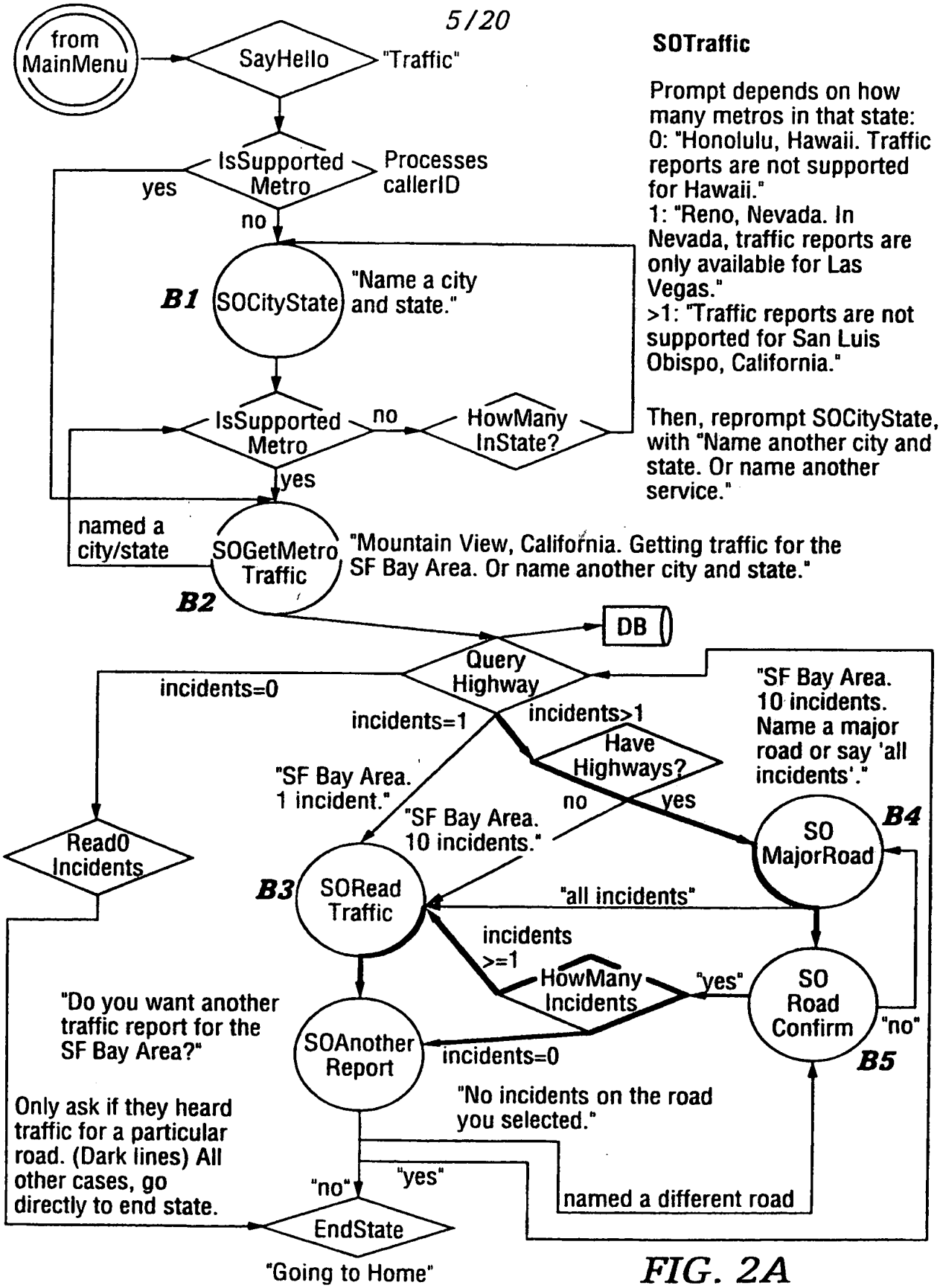
It might seem "different" to check IsSupportedMetro before confirming the user's response, but it makes for a more efficient dialogue (see sample #2 below.)

1. User says a supported metro:
Traffic. Getting traffic reports for the Greater Spokane area. Or name another city and state.
"Mountain View, California"
<isSupportedMetro=yes>
Mountain View, California. Is that Right? *[explicit confirm]*
"yes"
Mountain View, CA. Getting traffic reports for the Greater San Jose area. *[omit 'or name another...']*
[still include time for user to say 'stop'?]

2. User says an unsupported metro:
Traffic. Getting traffic reports for the Greater Spokane area. Or name another city and state.
"Reno, Nevada"
<isSupportedMetro=no> *[omit explicit confirm if metro not supported]* Traffic reports are not available for Reno, Nevada. Name another city and state. <listen 3 seconds> If you're done here, say Home. *[new no-speech prompting. Doable?]*
"Las Vegas, Nevada"
Las Vegas, Nevada. Is that right?...

3. If you say 'no' to any implicit or explicit confirm, or if your callerID is not in a supported metro, you land in SOCitystate:
Name a city and state. *[should this be: what city and state do you want traffic for?]*
"Denver, Colorado"
<isSupportedMetro>
Denver, Colorado. Is that right? *[explicit confirm]*
"yes"
Denver, Colorado. Getting traffic reports for the Greater Denver area.
[omit 'or say another...']
-OR-
"no"
Please repeat the city and state.

FIG. 2B



SOTraffic

Prompt depends on how many metros in that state:
0: "Honolulu, Hawaii. Traffic reports are not supported for Hawaii."
1: "Reno, Nevada. In Nevada, traffic reports are only available for Las Vegas."
>1: "Traffic reports are not supported for San Luis Obispo, California."

Then, reprompt SOCityState, with "Name another city and state. Or name another service."

FIG. 2A

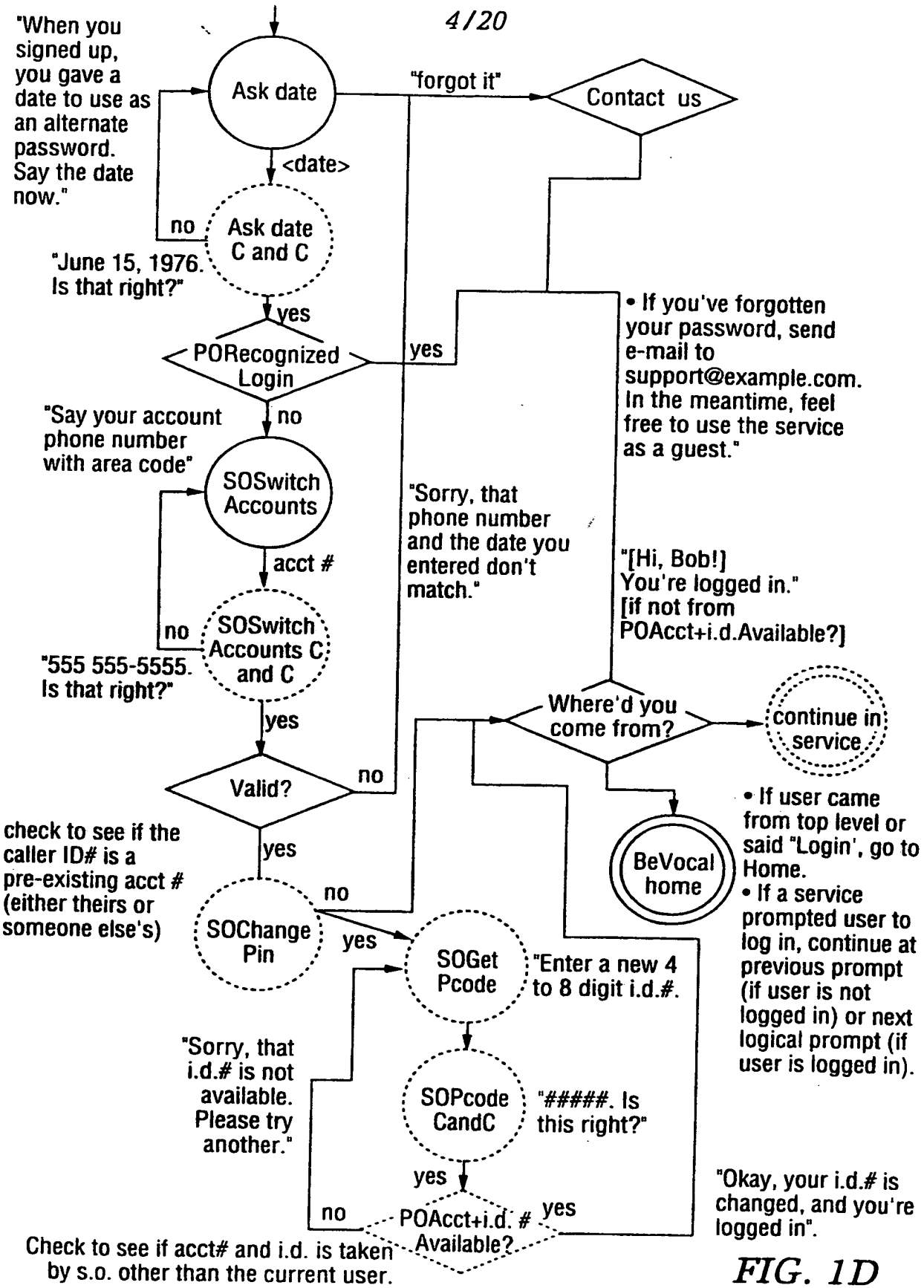

"When you signed up, you gave a date to use as an alternate password. Say the date now."
Ask date
"forgot it"
Contact us
<date>
no
Ask date C and C
"June 15, 1976. Is that right?"
yes
PORecognized Login
yes
• If you've forgotten your password, send e-mail to support@example.com. In the meantime, feel free to use the service as a guest."
no
"Say your account phone number with area code"
SOSwitch Accounts
"Sorry, that phone number and the date you entered don't match."
acct #
"[Hi, Bob!] You're logged in." [if not from POAcct+i.d.Available?]
no
SOSwitch Accounts C and C
"555 555-5555. Is that right?"
Where'd you come from?
continue in service
yes
Valid?
no
• If user came from top level or said "Login', go to Home.
• If a service prompted user to log in, continue at previous prompt (if user is not logged in) or next logical prompt (if user is not logged in).
BeVocal home
check to see if the caller ID# is a pre-existing acct # (either theirs or someone else's)
yes
no
SOChange Pin
yes
SOGet Pcode
"Enter a new 4 to 8 digit i.d.#.
"Sorry, that i.d.# is not available. Please try another."
SOPcode CandC
"#####. Is this right?"
yes
no
POAcct+i.d. # Available?
yes
"Okay, your i.d.# is changed, and you're logged in".
Check to see if acct# and i.d. is taken by s.o. other than the current user.

FIG. 1D

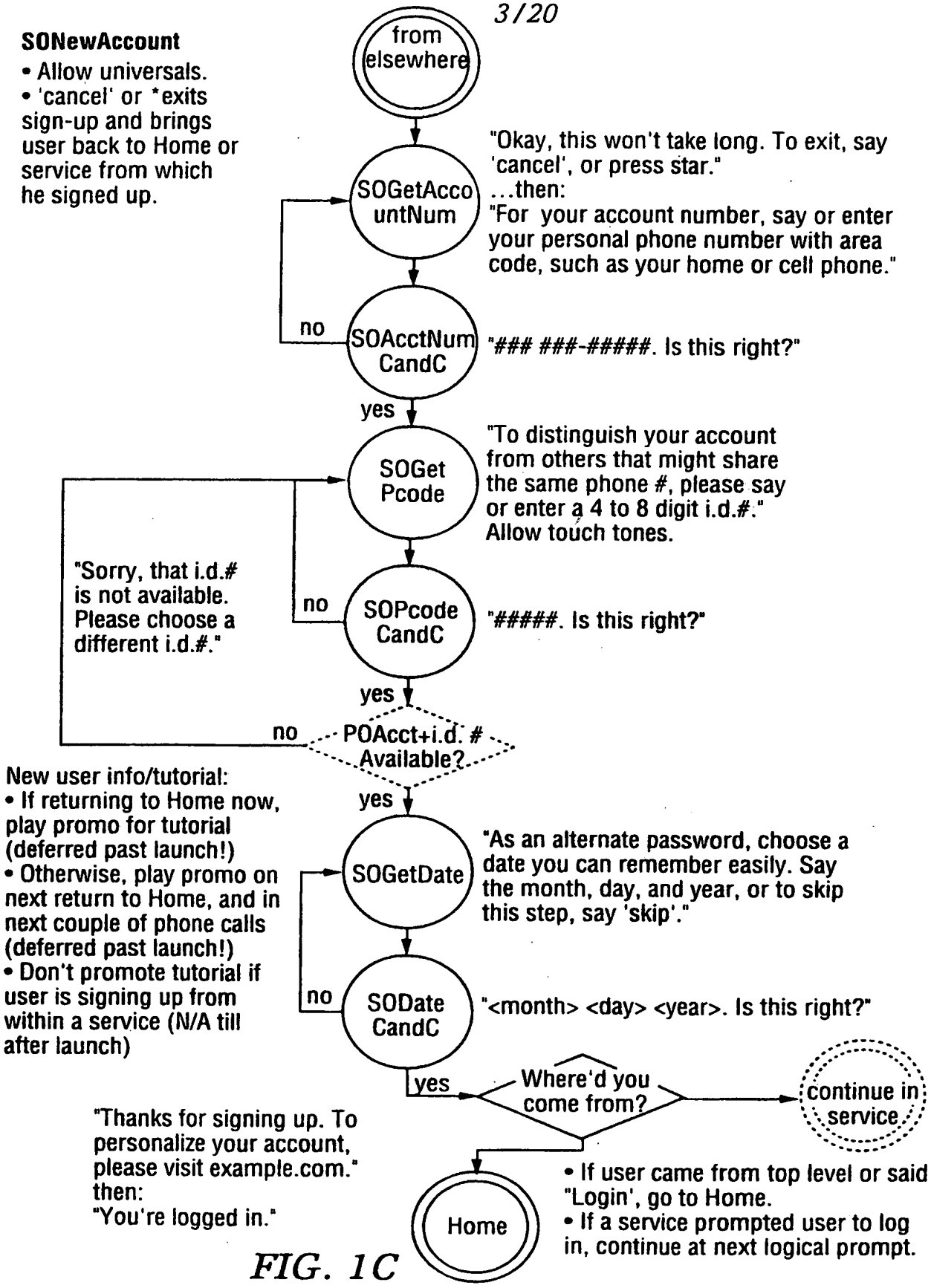

SONewAccount
• Allow universals.
• 'cancel' or *exits sign-up and brings user back to Home or service from which he signed up.
from elsewhere
"Okay, this won't take long. To exit, say 'cancel', or press star."
...then:
"For your account number, say or enter your personal phone number with area code, such as your home or cell phone."
SOGetAccountNum
no
SOAcctNumCandC
"### ###-#####. Is this right?"
yes
SOGetPcode
"To distinguish your account from others that might share the same phone #, please say or enter a 4 to 8 digit i.d.#."
Allow touch tones.
"Sorry, that i.d.# is not available. Please choose a different i.d.#."
no
SOPcodeCandC
"#####. Is this right?"
yes
no
POAcct+i.d.# Available?
yes
New user info/tutorial:
• If returning to Home now, play promo for tutorial (deferred past launch!)
• Otherwise, play promo on next return to Home, and in next couple of phone calls (deferred past launch!)
• Don't promote tutorial if user is signing up from within a service (N/A till after launch)
SOGetDate
"As an alternate password, choose a date you can remember easily. Say the month, day, and year, or to skip this step, say 'skip'."
no
SODateCandC
"<month> <day> <year>. Is this right?"
yes
Where'd you come from?
continue in service
"Thanks for signing up. To personalize your account, please visit example.com."
then:
"You're logged in."
Home
• If user came from top level or said "Login', go to Home.
• If a service prompted user to log in, continue at next logical prompt.

FIG. 1C

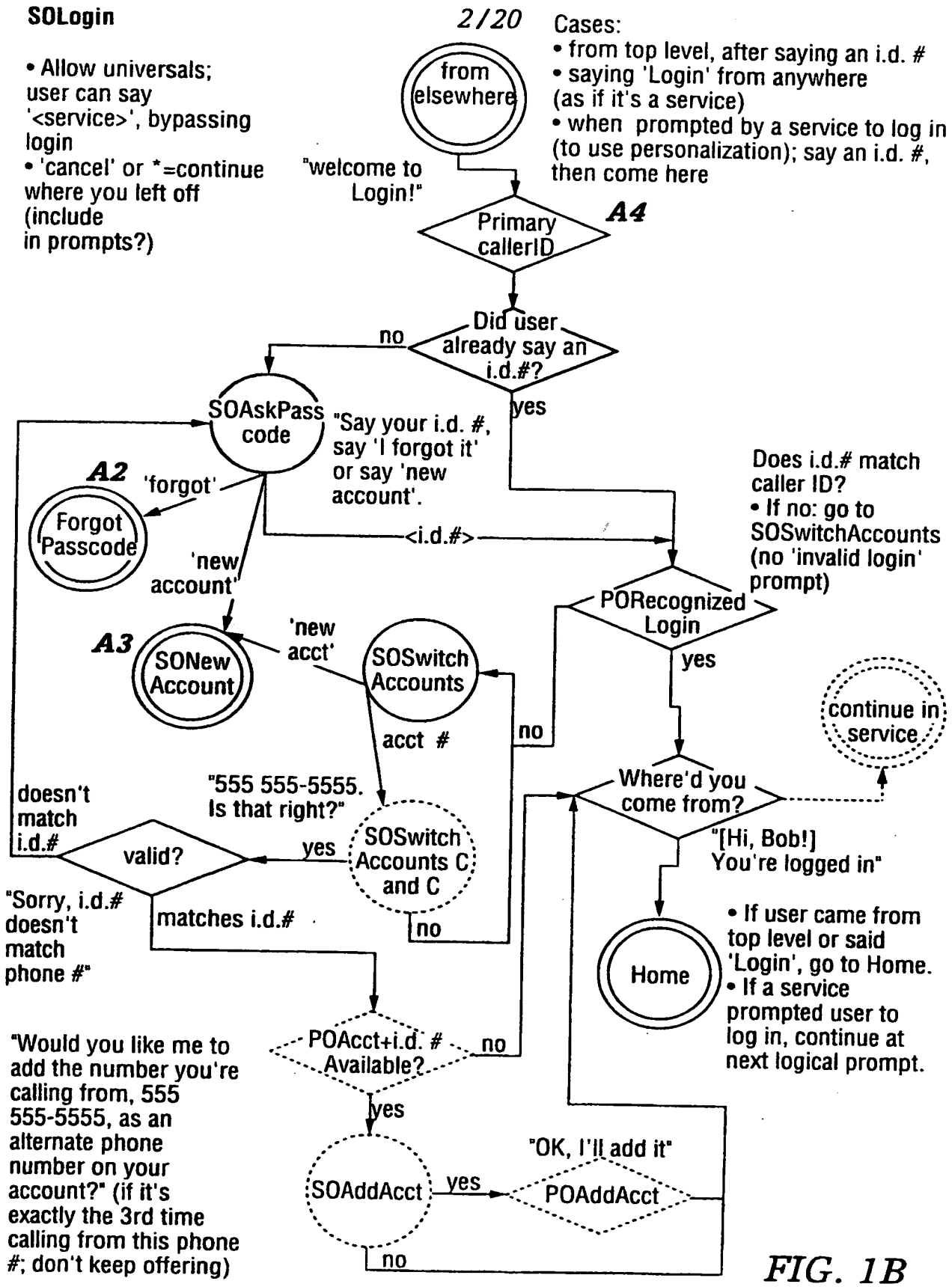

SOLogin
• Allow universals; user can say '<service>', bypassing login
• 'cancel' or *=continue where you left off (include in prompts?)
2/20
Cases:
• from top level, after saying an i.d. #
• saying 'Login' from anywhere (as if it's a service)
• when prompted by a service to log in (to use personalization); say an i.d. #, then come here
from elsewhere
"welcome to Login!"
Primary callerID
A4
Did user already say an i.d.#?
no
yes
SOAskPass code
"Say your i.d. #, say 'I forgot it' or say 'new account'.
A2
'forgot'
Forgot Passcode
'new account'
<i.d.#>
Does i.d.# match caller ID?
• If no: go to SOSwitchAccounts (no 'invalid login' prompt)
PORecognized Login
A3
SONew Account
'new acct'
SOSwitch Accounts
acct #
no
yes
continue in service
Where'd you come from?
"[Hi, Bob!] You're logged in"
Home
• If user came from top level or said 'Login', go to Home.
• If a service prompted user to log in, continue at next logical prompt.
"555 555-5555. Is that right?"
SOSwitch Accounts C and C
yes
valid?
doesn't match i.d.#
"Sorry, i.d.# doesn't match phone #"
matches i.d.#
no
"Would you like me to add the number you're calling from, 555 555-5555, as an alternate phone number on your account?" (if it's exactly the 3rd time calling from this phone #; don't keep offering)
POAcct+i.d. # Available?
no
yes
SOAddAcct
yes
"OK, I'll add it"
POAddAcct
no

FIG. 1B

Top-level Call Flow

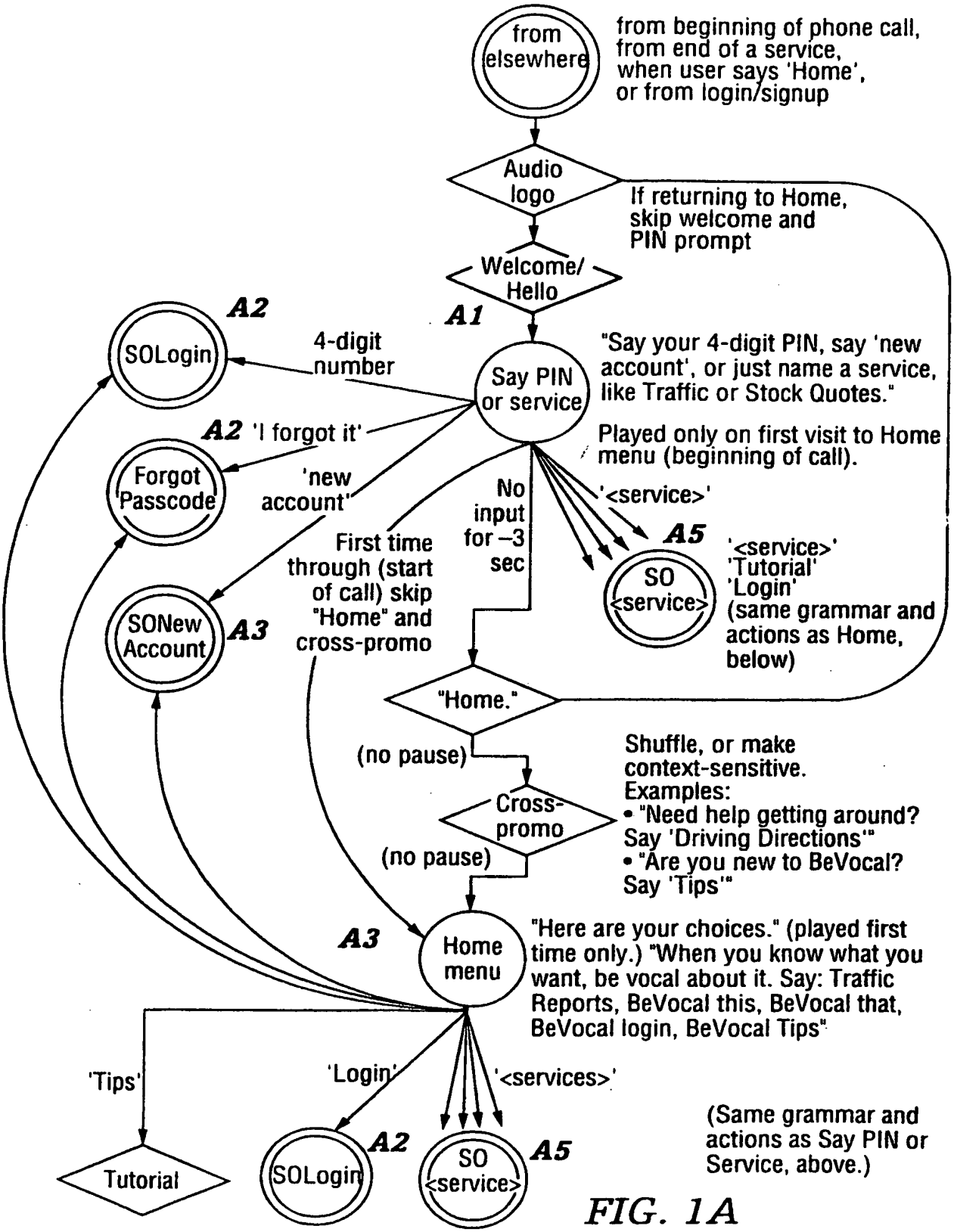


FIG. 1A

canceling the subsequent action upon a caller's corrective vocalization.

determining driving directions between the reference address and the business address, and conveying the driving directions to the caller.

60. The method in claim 27 further comprising the step of,

conveying that the caller can request to hear directions to a business address and if the caller requests to hear directions,

prompting the caller to enter an reference address from which to determine driving directions,

determining driving directions between the reference address and the business address, and conveying the driving directions to the caller.

61. In a vocal user interface for use on a computer system , a method of interfacing with a caller, comprising:

querying the caller with a prompt intended to evoke either an affirmative response or a negative response from the caller, and

interpreting any response other than an affirmative response or a negative response as an affirmative response to the query, and

utilizing the caller response in a subsequent query to the caller.

62. In a vocal user interface implemented on a computer, a method of interfacing with a caller, comprising:

making an educated inferential decision regarding what will be the caller's most probable utterances in a conversation state where caller-specific information is accessible,

performing a subsequent action within the vocal user interface based on the educated inferential decision, and

conveying the business addresses to the caller.

57. The method in claim 23 further comprising the step of,

conveying that the caller can request to hear directions to a business address and if the caller requests to hear directions,

prompting the caller to enter an reference address from which to determine driving directions,

determining driving directions between the reference address and the business address, and conveying the driving directions to the caller.

58. The method in claim 25 further comprising the step of,

conveying to the caller the number of businesses found and

prompting whether the caller desires to hear the business addresses closest to a reference address, and if the caller answers affirmatively,

obtaining a reference address from the caller,

searching the independent service-database to find relevant business addresses,

conveying the business addresses to the caller.

59. The method in claim 25 further comprising the step of,

conveying that the caller can request to hear directions to a business address and if the caller requests to hear directions,

prompting the caller to enter an reference address from which to determine driving directions,

utilizing the caller response in a subsequent query.

53. The method in claim 14 wherein the investment indicator comprises,

an investment indicator selected from the group consisting of; a publicly traded investment vehicle ticker symbol, the name of the business entity issuing the publicly traded investment vehicle, a market indicator ticker symbol, or a market indicator name.

54. The method in claim 21 wherein the step of conveying further comprises;

prompting the caller to vocally enter a request for extended forecast information, and if it is available,

conveying the extended forecast information to the caller.

55. The method in claim 23 wherein,

acceptable caller vocal entries are selected from the group consisting of; a particular business name, and a business type.

56. The method in claim 23 further comprising the step of,

conveying to the caller the number of businesses found and

prompting whether the caller desires to hear the business addresses closest to a reference address, and if the caller answers affirmatively,

obtaining a reference address from the caller,

searching the independent service-database to find relevant business addresses,

the address software routine further comprises a software dialog that accepts verbally entered addresses from the caller.

49. The driving directions vocal user interface in claim 46 wherein,

the address software routine accepts addresses from an independent software program.

50. The driving directions vocal user interface in claim 46 further comprising,

software means for storing the driving directions, and

software means for conveying the driving directions to the caller in a subsequent interaction with the driving directions vocal user interface.

51. The driving directions vocal user interface in claim 49 wherein,

the independent software program is selected from the group consisting of; a business finder program module, or an address finder program module.

52. In a vocal user interface for use on a computer system , a method of interfacing with a caller, comprising:

querying the caller with a prompt intended to evoke either an affirmative response or a negative response from the caller, and

interpreting any response other than an affirmative response or a negative response as a negative response to the query, and

a telephony software dialog that accepts a caller's vocal command to initiate a telephone call to contact the business.

45. The business finder vocal user interface in claim 40 further comprising,

a driving directions software dialog that accepts a caller's source address and computes driving directions to the retrieved results of the business search request.

46. A driving directions vocal user interface in a computer system comprising,

an address software routine that accepts source and destination addresses during a telephone call,

a software interface that accesses an service-database to search for and retrieve driving directions between the source and destination addresses, and

text-to-speech software that translates the retrieved driving directions to speech for conveyance to a caller.

47. The driving directions vocal user interface in claim 46 wherein the address software dialog further comprises,

a second software dialog that prompts for and accepts a callers request that the directions be given from a point other than from the source address.

48. The driving directions vocal user interface in claim 46 wherein,

software code that infers a city and state for a callers desired business location based upon information delivered during a telephone call,

a business finder software dialog that prompts the caller to vocally enter a business search request,

a software module that accesses a service-database to search for and retrieve results for the business search request, and

text-to-speech software that conveys the results to a caller.

41. The business finder vocal user interface in claim 40 wherein,

the information delivered during a telephone call is at least a portion of a caller telephone number.

42. The business finder vocal user interface in claim 40 wherein,

in a subsequent caller interaction with the vocal user interface, the software code that infers a city and state for a callers desired business location based upon information delivered during a telephone call, infers based on a previous caller interaction with the vocal user interface.

43. The business finder vocal user interface in claim 40 wherein,

acceptable caller vocal entries are selected from the group consisting of; a particular business name, and a business type.

44. The business finder vocal user interface in claim 40 further comprising,

37. An address finder vocal user interface for use in a computer system comprising;

a first caller address search software dialog that prompts for and accepts search requests from the group consisting of; an address within a city and state, a landmark address non specific to callers, a landmark address specific to a caller,

a software interface that accesses a service-database to search for and retrieve results for the search request, and

text-to-speech software that translates the results to speech.

38. The address finder vocal user interface in claim 37 wherein,

the address search request is an address within a city and state, and further comprising,

a second caller address search software dialog that prompts for and accepts search requests from the group consisting of; a street number or a cross-street name.

39. The address finder vocal user interface in claim 37 wherein,

the address search request is a landmark address specific to a caller, and further comprising,

software that access and retrieves an address stored in a private caller profile.

40. A business finder vocal user interface for use in a computer system comprising.

32. The method in claim 31 further comprising,

pausing the step of conveying the driving directions to the caller upon a vocal command from the caller.

33. The method in claim 31 further comprising,

saving the list of driving directions in a caller private profile,

resuming the step of conveying the driving directions to the caller.

34. The method in claim 33 wherein,

the step of resuming is performed in a subsequent vocal user interface application session.

35. The method in claim 31 wherein,

the step of conveying the driving directions to the caller is performed in a manner selected from the group consisting; email, fax, wap, or audible.

36. The method in claim 31 further comprising,

prompting whether the caller wants to hear all of the directions on a route from the start or from another point in the route.

conveying the information to the caller.

29. The method in claim 28 wherein

the flight information request comprises arrival or departure information for unknown airlines, and the method further comprises,

searching the independent service database for information items meeting the request,

retrieving information items meeting the request,

conveying the information items to the caller in a list.

30. The method in claim 28 wherein

the flight information request comprises arrival or departure information regarding a particular flight that has multiple legs, and the method further comprises,

prompting if the caller wants to hear information regarding all the legs or regarding a particular leg.

31. The method in claim 9 wherein,

the caller selected the driving directions service-database, and the method further comprises,

prompting the caller to enter at least one address,

searching the driving directions service-database,

conveying the driving directions to the caller.

searching the service-database to find a business address satisfying the business search request,

conveying the business address to the caller.

26. The method in claim 25 wherein the information delivered during the telephone call is selected from a group of information items consisting of; a portion of the caller's telephone number, or a city and state stored in a caller private profile.

27. The method in claim 26 further comprising the step of,

conveying to the caller the number of businesses found and

prompting whether the caller desires to hear the business addresses closest to a reference address, and if the caller answers affirmatively,

obtaining a reference address from the caller,

searching the independent service-database to find relevant business addresses,

conveying the business addresses to the caller.

28. The method in claim 9 wherein if the flight information service-database is selected, the step of accessing an service-database further comprises;

prompting the caller to vocally enter a flight information request,

searching the independent flight information service-database,

retrieving information that most closely matches the caller's flight information request,

23. The method in claim 9 wherein if the business finder service-database is selected, the step of accessing an service-database further comprises;

prompting the caller to vocally enter a city and state,

prompting the caller to vocally enter a business search request,

searching the service-database to find a business address satisfying the business search request,

conveying the business address to the caller.

24. The method in claim 23 further comprising the step of,

prompting whether the caller desires to hear the business address, and if the caller answers affirmatively,

prompting the caller to enter an reference address from which to determine driving directions,

determining driving directions between the reference address and the business address, and

conveying the driving directions to the caller.

25. The method in claim 9 wherein if the business finder service-database is selected, the step of accessing an service-database further comprises;

inferring a city and state based upon information delivered during the telephone call,

prompting the caller to vocally enter a business search request,

inferring a city and state for which weather information is desired based upon information conveyed by the caller,

searching the service-database to find current weather conditions for the city and state;

conveying the current weather conditions to the caller.

20. The method in claim 19 wherein the information conveyed by the caller is selected from a group of information items consisting of; a portion of the caller's telephone number, or a city and state stored in a caller private profile.

21. The method in claim 9 wherein if the weather condition service-database is selected, the step of accessing an service-database further comprises;

prompting the caller to vocally enter a city and state for which weather information is desired,

searching the service-database to find current weather conditions for the city and state;

conveying the current weather conditions to the caller.

22. The method in claim 21 wherein the step of conveying further comprises;

prompting the caller to vocally enter a request for extended forecast information, and if it is available,

conveying the extended forecast information to the caller.

prompting the caller to vocally select an investment indicator about which to receive more detail, and

conveying more detail to the caller upon receipt of the caller's vocal selection.

16. The method in claim 9 wherein if the stock information service-database is selected, the step of accessing the service-database further comprises:

retrieving an investment indicator from a private caller profile;

searching the service-database for the most recent value associated with the investment indicator,

conveying the most recent value to the caller.

17. The method in claim 14 further comprising the step of,

adding or removing an investment indicator from the private caller profile upon receipt of a vocal command to do so by the caller.

18. The method in claim 14 further comprising the step of,

providing more or less information about a particular investment indicator upon receipt of a vocal command to do so by the caller

19. The method in claim 9 wherein if the weather condition service-database is selected, the step of accessing an service-database further comprises;

searching the number of traffic related incidents that pertain to the city and state;

prompting the caller to enter a road by name;

searching the location of traffic related incidents that pertain to the road, and if there is traffic related information regarding the incidents on the road;

conveying the traffic related information regarding the incidents to the caller.

13. The method in claim 12 further comprising,

prompting the caller to vocally select a particular traffic related incident about which to receive more detail, and

conveying more detail to the caller upon receipt of the caller's vocal selection.

14. The method in claim 9 wherein if the stock information service-database is selected, the step of accessing the service-database further comprises:

prompting the caller to enter an investment indicator;

searching the independent service-database for the most recent value associated with the investment indicator,

conveying the most recent value to the caller.

15. The method in claim 14 further comprising,

10. The method in claim 9 wherein if the traffic condition service-database is selected, the step of accessing the service-database further comprises:

prompting the caller to vocally enter a city and state;

searching the number of traffic related incidents that pertain to the city and state;

prompting the caller to enter a road by name;

searching the location of traffic related incidents in that pertain to the road, and if there is traffic related information regarding the incidents on the road;

conveying the traffic related information regarding the incidents to the caller.

11. The method in claim 10 further comprising,

prompting the caller to vocally select a particular traffic related incident about which to receive more detail, and

conveying more detail to the caller upon receipt of the caller's vocal selection.

12. The method in claim 9 wherein if the traffic condition service-database is selected, the step of accessing the service-database further comprises:

inferring a city and state of interest for the caller based upon at least a portion of the caller's telephone number;

aborting the processing of any step in the method upon receipt of a vocal command to do so by the caller.

6. The method in claim 3 further comprising,

checking a caller private profile that is identifiable with the caller by an account number.

7. The method in claim 6 further comprising,

inferring the caller account number based upon information delivered during the telephone call.

8. The method in claim 7 further comprising,

storing a portion of the caller's desired information in the caller private profile, and

inferring at least a portion of the caller's desired information based upon the stored portion of the caller's desired information.

9. The method in claim 1 wherein the service-database that contains information regarding the caller's desired information is selected from a group of service-databases consisting of;

a traffic condition service-databases, a stock information service-databases, a business finder service-databases, a weather condition service-databases, a flight information service-databases, or a driving directions service-databases.

prompting the caller to enter a second vocal expression that more narrowly describes, relative to the vocal expression in the first vocal user interface program module, the caller's desired information,

accessing a service-database that contains information regarding the caller's desired information,

searching the service-database for a database sample that most closely satisfies the service-search expression,

retrieving the caller's desired information from the service-database,

formatting the caller's desired information into a vocal output, and

conveying the vocal output of the caller's desired information to the caller,

within the second vocal user interface program module.

3. The method in claim 1 further comprising the step of,

inferring at least a portion of the caller's desired information based upon information delivered during a telephone call.

4. The method in claim 3 wherein the information delivered during a telephone call comprises,

at least a portion of a telephone number.

5. The method in claim 1 further comprising:

CLAIMS

1. In a computer system, a method of retrieving and conveying information requested by a caller, comprising:

initiating a vocal user interface application session upon receipt of a telephone call from the caller;

within a first vocal user interface program module, prompting the caller to enter a first vocal expression that describes the caller's desired information;

prompting the caller to enter a second vocal expression that more narrowly describes, relative to the vocal expression in the first vocal user interface program module, the caller's desired information,

accessing a service-database that contains information regarding the caller's desired information,

searching the service-database for a database sample that most closely satisfies the service-search expression,

retrieving the caller's desired information from the service-database,

formatting the caller's desired information into a vocal output, and

conveying the vocal output of the caller's desired information to the caller.

2. The method in claim 1 further comprising the steps of,

recognizing the first vocal expression as a command to transition to a second vocal user interface program module;

transitioning to a second vocal user interface program module, and performing the steps of,

Speech Object to determine directions to a particular location, save the driving directions to the caller private profile, and disconnect the telephone call. The caller is prompted whether they would like to resume using the saved driving directions when they call again and login (SOResume **H6**).

The preferred embodiment of the invention is described above in the Drawings and Description of Preferred Embodiments. While these descriptions directly describe the above embodiments, it is understood that those skilled in the art may conceive modifications and/or variations to the specific embodiments shown and described herein. Any such modifications or variations that fall within the purview of this description are intended to be included therein as well. Unless specifically noted, it is the intention of the inventor that the words and phrases in the specification and claims be given the ordinary and accustomed meanings to those of ordinary skill in the applicable art(s). The foregoing description of a preferred embodiment and best mode of the invention known to the applicant at the time of filing the application has been presented and is intended for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed, and many modifications and variations are possible in the light of the above teachings. The embodiment was chosen and described in order to best explain the principles of the invention and its practical application and to enable others skilled in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated.

Object or from another program module, such as the Business Finder Speech Object. If the Speech Object is evoked from another program module such as Business Finder Speech Object, known addresses are passed from the first program module to the Driving Directions Speech Object. Otherwise, the Driving Directions Speech Object contains speech objects to determine either the caller's source or destination address (SOSourceAddress **H1** and SODesitinationAddress **H2**, respectively).

The Driving Directions Speech Object interfaces with the API of an independent service-database to retrieve point-to-point driving directions. Upon retrieval of the driving directions, the Driving Directions Speech Object formats the driving directions into a list that is conveyed to the caller (SOReadDirections **H3**). The caller can navigate the list by uttering appropriate speech grammars (e.g. "next", "previous", "start over", "stop", "pause"). Alternatively, the caller may also receive the driving directions by email or facsimile (SODrectionDeliveryMethod **H4**). Moreover, if a portion of the caller's driving directions includes a particularly long stretch of road, the Driving Directions Speech Object dynamically creates a prompt to query whether the caller wants to hear directions from the first step or starting after that road (SOStartFrom **H5**).

For logged in callers, the Driving Directions Speech Object has the added capability of storing a set of driving directions in the caller private profile after they have been determined, and further creating a prompt that evokes the saved directions. Thus a caller may use the Driving Directions

The caller may also pick a flight without any specific information about a airline or flight number. Figure G3 depicts the Itinerary Speech Object which is invoked if the caller does not know the airline or flight number when conversing with the Flight Information Speech Object. The Itinerary Speech Object includes speech objects that allow the caller to choose a flight regardless if an airline is known. For example, if the caller has not entered an airline in the Flight Information Speech Object, the Itinerary Speech Object will engage the caller in a dialog to determine an airline (e.g. tCheckAirline **G10**, soAirline **G11**). If the caller does not know the airline, the Itinerary Speech Object will engage the caller in a speech object to determine the airline if it is supported by the Service-Database **60**. If not the caller is prompted for another airline (tAnotherAirline **G12**).

The Itinerary Speech Object engages the caller in speech objects to determine the departure city (SOAirportCity(departure) **G13**) and arrival city (SOAirportCity(arrival) **G14**) and then in a fight time Speech Object (soFlightTime **G15**). The Itinerary Speech Object next checks with an Itinerary check and confirm speech object (SO ItineraryCandC **G16**), gets a list of flights meeting the caller's requirements from the flight information Service-Database **60**, and conveys it to the caller (SOReadRoutes **G17**).

Driving Directions Program Module Speech Object

The Driving Directions Speech Object determines point-to-point driving directions given two addresses. See Figure H. The Driving Directions Speech Object can be evoked both as a stand-alone program module Speech

transition to the Flight Information Speech Object, the caller is prompted to utter an airline and flight number (SOAirlineFlight **G2**), to utter an airline or flight number, or to utter neither the airline or flight number.

Alternate speech objects are transitioned to depending upon the extent of information known by the caller and conveyed to the Flight Information Speech Object. If the caller utters either only the airline or flight number, the Flight Information Speech Object transitions to speech objects that prompt the caller to utter either the flight number (SOFlightNumber **G3**) or the airline (SOAirline **G4**), respectively. The Flight Information Speech Object then confirms the caller's airline and flight number (SOFlightInfoCandC **G5**) and assumes that flight information is desired on the day of the call, but optionally allows the caller to check flight information for another date (SOFlightDate **G6**). Upon confirmation of the caller's desired flight information the Flight Information Speech Object interfaces with the API of the flight information Service Database to retrieve the caller's desired flight information.

The Flight Information Speech Object will transition alternate speech objects depending upon the flight information retrieved from the Service-Database. No available information results in a prompt to perform another search (tSearchAnotherFlight **G7**). The existence of multiple flight legs invokes a Speech Object that allows the caller to optionally choose a specific leg of the flight (SOChooseLeg **G8**) for which to hear information. Otherwise, the Flight Information Speech Object will convey the flight status information to the caller (SOFlightStatus **G9**).

Upon uttering a city and state, the caller is engaged in dialogs to name and confirm a desired street (SO_StreetName **F3**), name and confirm a street number (SO_StreetNumber **F4**), or alternatively, if the street number is not known, a cross street (SO_CrossStreet **F5**). When the Address Module has received the caller's desired address, the Address Module prompts the caller to confirm the address or, in appropriate circumstances will engage the caller in a disambiguation and confirmation Speech Object (SO_AddressDisambiguationAndConfirm **F6**) to resolve the ambiguity.

Upon obtaining the caller's final address, the Address Disambiguation Speech Object engages the caller in speech objects that enable the caller to change only a subset of information conveyed to the Address Disambiguation Speech Object or alternatively, to begin searching from scratch. For example, the caller may change the street name, or the cross street name.

Flight Information Program Module Conversational State Diagram

Figure G1 depicts the conversation state diagram of the Flight Finder Program Module ("Flight Finder Speech Object"). Upon a transition to the Flight Information Speech Object, the caller is greeted and prompted to utter whether the caller wants arrival or departure information (SO Arrival Departure **G1**) upon which the Flight Finder Speech Object transitions to the Flight Information Program Module ("Flight Information Speech Object").

Figure G2 depicts the conversation state diagram of the Flight Information Program Module ("Flight Information Speech Object"). Upon a

Object is ordinarily transitioned to from another Speech Object that needs to locate a specific address to perform a function that requires knowing a specific street address (e.g. driving directions). Upon a transition to the Address Speech Object, the caller is prompted to utter a particular city and state of interest (SO_CityState **F1**) or to utter a Landmark.

Landmarks are preassigned speech grammars that can be both global or particular to each caller and stored in each caller's private profile. "Airport" is a special global grammar landmark that evokes an Airport Finder Speech Object. The Airport Finder Speech Object searches the caller private profile for a preferred preference and confirms this preference with the caller, who may opt otherwise and engage in a dialog to pick an alternate airport.

If the caller utters another landmark that is particular to the caller private profile, the Address Module will access the address associated with the Landmark and return to the original program module from where the transition came. If however, there is more than one address that meets the caller's uttered Landmark (e.g. "airport"), the Address Module will transition to an airport city disambiguation list dialog (SO_AirportCity **F2**) to identify the caller's desired airport and subsequently confirm and convey the desired information to the caller. The Address Speech Object will loop back and reengage the caller in the airport city list dialog if the city and state is not supported by the database or if the caller conveys that the choice of airports is incorrect.

to the caller's preferences in accordance with previously described capabilities. Process flow control returns to the Stock Information Speech Object upon completion of the list of stock information.

Weather Conditions Program Module Conversational State Diagram

Figure E1 depicts the Weather Conditions Speech Object ("Weather Speech Object"). Upon receipt of a caller's utterance meeting an acceptable speech grammar for the Weather Speech Object, the caller is greeted. Moreover, the Weather Speech Object infers a city for the caller based upon the caller private profile or caller's telephone number and conveys the inference to the caller (WeatherAssumeCity **E1**). Unless the caller utters a context specific cancellation speech grammar (e.g. "new city") within a finite time interval, the Weather Speech Object retrieves the weather information for the city. Else the Weather Speech Object prompts the caller to enter another city for which the Weather Conditions Speech Object will gather information (WeatherGetCity **E2**) and convey the most relevant weather information to the caller. Figure E2 depicts a List Speech Object for conveying the weather information to the caller in a list format and further checks the caller private profile to detect the preferred manner of receiving the weather information **E3** (i.e. extended or abbreviated forecasts).

Address Locating Program Module Conversational State Diagram

Figure F1 depicts the conversation state diagram of the Address Locating Program Module ("Address Speech Object"). The Address Speech

stocks or abbreviated information. Thus, the Stock Information Speech Object recognizes both contextually global - non temporal utterances (e.g. "long quotes") that will globally effect the extent of information to be conveyed about all stocks of interest, and item specific temporal utterances (e.g. "more information", or "more details") that effect the extent of information to be conveyed only about the specific stock that was just conveyed to the caller. Item specific temporal utterances are characterized by a finite temporal duration during which a caller's utterance is interpreted as an utterance only for a specific item in the list.

Figure D2 depicts a conversational state diagram reflecting additional functionality of the Stock Information Speech Object including adding and removing a stock to the caller private profile and effecting the previously described global - non temporal speech grammars and item specific temporal speech grammars. If the caller utters a speech grammar to hear more about a particular stock while it is being read to the caller (e.g. "long quotes" or "details"), the Stock Sub-Module performs a search of the stock information database for more information, and subsequently transitions back to the Stock Information Speech Object and conveys an appropriate audible prompt to the caller depending upon the information retrieved by the performed search.

Figure D3 depicts an example of a conversational state diagram for conveying stock information list items to the caller (SOReadData **D2**). The List Speech Object automatically sequentially relays the stock information to the caller stopping only to interpret caller utterances and make modifications

Speech Object by uttering a speech grammar that evokes the Stock Information Speech Object.

Upon the caller's utterance of a speech grammar indicating that stock information is desired (e.g. "Stock"), the Stock Information Speech Object conveys an audible confirmation to the caller (SO_AssumePortfolio **D1**). Further, if the caller has established a stock portfolio in the private caller profile, a speech object audibly alerts the caller that the Stock Information Speech Object will assume what stocks are of particular interest to the caller based upon the private caller profile. The Stock Information Speech Object then interfaces with the API of the Stock Information database and retrieves the most currently available data and reads it to the caller in a List Speech Object.

The caller may opt out of the assumption by uttering a speech grammar that indicates the caller's desire to do so (e.g. the caller names a particular stock). If the caller's assumed portfolio is empty, or if the caller cancels the presumption, the Stock Information Speech Object prompts the caller to utter a stock information indicator (e.g. company name, ticker symbol, or market index name). Upon receipt of the caller's uttered stock information indicator, the Stock Information Speech Object performs a search of the stock information database and reads the stock information to the caller.

Moreover, the Stock Information Speech Object permits the caller to customize preferences regarding how the information is to be conveyed to the caller. For example, the caller may wish to receive detailed information about

(SO_ListResults **C6**), the caller can navigate the list by uttering an appropriate grammar such as "next" or "previous". The caller may also select a business on the list by uttering an appropriate speech grammar such as "that one" or "more information". Once a caller selects a business on the list, the caller may choose either to receive driving directions or to place a telephone call to the business selected. The Business Finder Speech Object audibly confirms the caller's choice and prompts the caller to utter the caller's desired action (SO_OneLocation **C7**). If the caller utters a "connect me" or similar speech grammar, the Telephony Network Server initiates a telephone call to the telephone number associated with the business selected by the caller. Else, if the caller utters a speech grammar associated with "directions", the Business Finder Speech Object will access the Driving Directions Speech Object if the full address of the business selected by the caller was available in the Service-Database.

Finally, the Business Finder Speech Object permits the caller to perform additional searches **C9**, search for similar type businesses **C10** (i.e. within a same business type category), or find the nearest business **C11** on the list by uttering appropriate speech grammars (e.g. "new search", "find similar", or "find nearest", respectively).

Stock Information Program Module Conversational State Diagram

Figure D1 depicts a Stock Information Program Module conversational state diagram ("Stock Information Speech Object"). The caller can select the Stock Information Program Module from the above Main Menu program

matches that are more than a specified distance away (e.g. more that 50 miles). If however, there are no matches within the specified distance, the Business Finder Speech Object adds back in the matches removed in the previous step.

If there are multiple matches retrieved from the search, the Business Finder Speech Object prompts (e.g. SO_FindNearest **C4**) the caller whether the caller wants to hear the match that is closest to the caller's presumed vicinity. If a confirming speech grammar is conveyed by the caller, the Business Finder Speech Object transitions to the Address Finder Speech Object (SOAddress **C5**) which returns processing control to the Business Finder Speech Object when the Address Finder Speech Object has recorded the caller's desired address. The Business Finder Speech Object then conveys the matches that are nearest the vicinity of the caller's address. However, if the caller elected not to provide an address, or if the search retrieves no matches within a specified radius (e.g. fifty miles) that meet the caller's request, a search of maximum radius is performed and the results are conveyed to the caller. If a maximum radius search retrieves zero matches, the caller is prompted whether a new search is desired.

The Business Finder Speech Object further includes the ability for the caller to initiate a telephone call that will connect the current call to a business establishment on the list, or provide driving directions to a business establishment. Figure C2 depicts a conversational state diagram of this additional functionality. As the search results are being read to the caller

Business Finder Program Module Conversational State Diagram

Figure C depicts a Business Finder Service Program Module conversational state diagram ("Business Finder Speech Object"). The caller can select the Business Finder Module from the above Main Menu Speech Object by uttering a speech grammar that evokes the Business Finder Module (e.g. "Business Finder").

In a preferred embodiment of the Business Finder Speech Object, the region of interest for the caller is presumed based upon information retained in the caller profile or based upon the area code and prefix of the caller's telephone number. The presumption is conveyed to the caller (e.g. SO_AssumeLocation **C1**) who may either convey an affirmative speech grammar to confirm that the presumption is correct, or optionally select another region of interest with an utterance having a negative connotation(e.g. "cancel") that will invoke a transition to another Speech Object that prompts the caller to enter the desired region of interest (e.g.SO_CityState **C2**).

Upon the caller's utterance of a speech grammar acquiescing to the Business Finder Speech Object's presumption or utterance and confirmation of an alternate city and state, the caller is prompted (e.g. SO_Brand/Category **C3)** to utter a specific brand name or to vocalize a category to search (e.g. "grocery stores"). Upon receipt of the caller's response, the Business Finder Speech Object interfaces with the API of the Business Finder Database and retrieves the information that most probably fulfills the caller's desires. The Business Finder Speech Object automatically first filters out

area if the caller at this time cancels the pending search by uttering a "cancel" or "stop" speech grammar.

Differing prompts are conveyed to the caller depending upon the amount of traffic information retrieved from the traffic Service-Database. For instance, "no traffic incidents" can be directly conveyed to the caller, or the occurrence of single traffic incident can also be directly conveyed to the caller (SO_ReadTraffic **B3**). Else, if there are several incidents, the Traffic Speech Object checks whether it has grammars of the metro area and if so prompts the caller to enter a primary road or utter whether all the traffic incident reports for that road are desired (SO_MajorRoad **B4**). If the Traffic Speech Object supports the major road, a confirmatory prompt (SO_RoadConfirm **B5**) is conveyed to the caller who may vocalize a confirmation and hear the traffic incident report for that major road (SO_ReadTraffic **B3**). Otherwise, if there are no highway grammars, all the traffic incidents are conveyed to the caller (SO_ReadTraffic **B3**). The list of traffic related incidents is initially brief, but the caller can request additional information by uttering "that one." After providing the additional information, the Traffic Speech Object continues reading the list. The Traffic Module prompts the caller to optionally perform another search prior to exiting to the Main Menu document.

In an alternate embodiment, the Traffic Speech Object engages the caller in a series of dialogs to determine a specific road. The Traffic Speech Object subsequently interfaces with the API of the Traffic Service-Database to determine and convey any available information to the caller.

state, the caller may utter several of the same navigational choices previously discussed.

Traffic Conditions Program Module Conversational State Diagram

Figure B1 depicts a Traffic Conditions Program Module conversational state diagram ("Traffic Speech Object"). The caller can select the Traffic Speech Object from the above Main Menu Speech Object module by uttering a speech grammar that evokes the Traffic Speech Object (e.g. "Traffic"). In turn, the Traffic Speech Object coveys prompts that direct the caller to utterances that indicate a region of interest for traffic condition information.

The Traffic Speech Object first processes the caller's area code and prefix, and if the metro area associated with the caller's area code and prefix are supported by the traffic Service-Database, the Traffic Speech Object conveys to the caller the presumption that the Traffic Speech Object will use the associated metro area for the caller's traffic region of interest (SO_GetMetroTraffic **B2**). Otherwise, if the metro area for the city-state combination is not supported, the Traffic Speech Object prompts the caller to utter a particular city-state combination of interest (SO_City/State **B1**), and the Traffic Module confirms a metro area associated with the caller's selected city-state combination. If the selected metro area is supported by the traffic Service-Database, the Traffic Module confirms that it will search the traffic Service-Database (e.g SO_GetMetroTraffic **B2**) for traffic related incidents in that metro area. The Traffic Module will prompt the caller for a new metro

personal information that enables the other program module Speech Objects to make educated inferential decisions regarding what will be the caller's most probable selections or utterances.

Figure A2 depicts a Login Speech Object (SOLogin **A4**) that permits the VUI Application to distinguish between callers. The Login Speech Object permits the caller to enter a personal identification number ("PIN") and enables the caller to invoke dialogs to determine a forgotten PIN (ForgotPasscode **A2**) or establish a new account (SONewAccount **A3**). The Login Speech Object associates each caller's PIN with their telephone number **A10**, thus upon login, the Login Speech Object process the caller's telephone number and verifies that it corresponds with the caller's PIN. If so, the Login Speech Object confirms the verification to the caller and returns to the program module it came from. If the caller does not login, or if the caller does not invoke the Login Speech Object, the Main Menu Speech Object transitions to the next state. Figure A3 depicts a Passcode Speech Object to retrieve a forgotten PIN. Figure A4 depicts a New Account Speech Object to establish a new account.

The caller may at any time return to the Main Menu document by uttering an acceptable speech grammar (e.g. "Home"). The Main Menu document jumps directly to a second abbreviated greeting (SO_HomeMenu **A6**) to account for the caller's familiarly with the VUI Application and to avoid the caller having to retrace the same navigated path. At this conversation

VUI Application Program Modules

VUI Application Main Menu Speech Object

Referring to figure A1, the Main Menu Speech Object comprises several component speech objects that transition either to other component speech objects within the Main Menu Speech Object or to other program module Speech Objects in the VUI Application.

Upon entry into the Main Menu Speech Object, the caller is greeted and prompted to utter a personal identification code or service name associated with a particular program module Speech Object (SO_Pin/Service **A1**). Diagram A depicts several possible transitions depending upon the caller's utterance. The caller may utter a grammar associated with a particular Service-Database program module (e.g. "Traffic") or with one of several caller administrative program modules (e.g. "Login", "New Account", "Service Tips", "Forgot Passcode").

If the caller utters a speech grammar corresponding to a Service-Database, the Main Menu document confirms the caller's choice (e.g. SO_Traffic, SO_Stocks) while transitioning to the program module Speech Object associated with the Service-Database **A5**. The Login program module Speech Object ("Login Speech Object") is of particular significance and enables accessing and creating a private caller profile to effect the customization of preferences and/or settings for each caller. For instance, the caller may enter home or work addresses, telephone numbers and other

the desired item. To disambiguate, the program modules of the VUI Application engage the caller in a standard disambiguation dialog to remove the ambiguity.

The VUI Application transitions to a disambiguation Speech Object when an ambiguity is detected. The first step is to convey the ambiguous items in a list to the caller. For example, the caller is first prompted that an ambiguity exists by conveying an appropriate prompt such as "Did you mean <item 1>, <item 2>, <item n> ...?" Further, the last item included in the list and conveyed to the caller is "none of the above" or a prompt with similar meaning. Then, selection of the desired item and navigation of the list by the caller is accomplished with appropriate utterance and speech grammar (e.g. "that one" or "previous item" & "the first one", respectively). Further, the Disambiguating Speech Object further creates dynamic speech grammars based upon the caller's utterance of a subset of each item to be disambiguated. For instance, in a Disambiguation Speech Object to determine a caller's actual desired New York airport, the Disambiguation Speech Object will prompt, "Did you mean, New York JFK, New York LaGuardia, Newark New Jersey, or none of these?" Both "New York, JFK" and "JFK" are acceptable utterances. Upon disambiguating the search items, the disambiguation dialog transitions to the next conversation state in the program module where the ambiguity arose.

"Stock Information Database") by vocalizing a recognized utterance that is enabled within the program module Speech Object.

Standard Treatment of Muti-Item Search Results

Because it is the intention of some searches of the Service-Databases to return several information items, it becomes necessary to effectively present the information to the caller in a manner that permits the caller to select the desired item. Thus, the VUI Application presents the information items to the caller by engaging the caller in a List Speech Object.

The List Speech Object comprises a preamble that will convey acceptable speech grammars to navigate the list, the number of items in a muti-item list, and an audible separator that will alert the caller that the next item on the list will be conveyed and that the response period within which to select the previous item has passed. Both auto-advance and mandatory vocalized navigation modes are available methods of navigating a List Speech Object. Further, selection of an item in the list or getting more information about an item in a list is accomplished by appropriate recognized speech grammars such as "that one" or "more details".

Standard Treatment of Search Result Ambiguities

Alternatively, there are circumstances when the user's utterance may be ambiguous to the VUI Application. Resolving the ambiguity, or disambiguation, in accordance with the present invention comprises a method of efficiently presenting the ambiguity to the caller and letting the caller select

Application through the API of the selected Service-Database to search for, retrieve, and convey the retrieved information to the Text-to-Speech and Media Server, which information is ultimately conveyed vocally to the caller through the Telephony Server.

The presently preferred embodiment of the VUI Application is implemented in speech objects with the program modules being implemented in distinct program module Speech Objects that further comprise reused component speech objects and custom component Speech Objects. Additionally, although speech objects are mainly intended to evoke specific recognized utterances from the caller, speech objects are also contemplated to be useful for conveying advertisements or other public and private information to the caller. The VUI Application and program module Speech Objects are more fully described below in the specification and the depicted conversational state diagrams.

VUI Application Universal Vocal Navigation

In accordance with the VUI Application, and because specific universal grammar associated with the VUI Application Main Menu is available within each distinct Speech Object program module, the VUI Application also provides for Universal Navigation commands at any point in the caller's navigation. For example, at any point after establishing a VUI Application session, the caller may vocalize a primary specific navigable point or a Service-Database (e.g. "Traffic Conditions Database", "Home Menu", or

Object interface between the caller and the API of the independent Service-Database that is responsive to recognized spoken commands ("utterances") and further includes recorded vocal navigation prompts that are conveyed to the caller to aid the caller's retrieval of information from the Service-Databases. Moreover, the VUI Application further comprises distinct program modules associated with each Service-Database that enable the employment of module specific speech objects and software code that is responsive to the caller's utterances ("speech grammars") that are particularly germane to the Service-Database.

The presently preferred program modules of the VUI Application include: a Traffic Condition Module, a Business Finder Module, a Stock Information Module, a Driving Directions Module, a Flight Information Module, and a Weather Conditions Module. It is contemplated that additional program modules will be integrated with the VUI Application to service the demand for additional vocally searchable Service-Databases.

The Media Server comprises hardware under program control to store the recorded prompts associated with the Speech Object program modules of the VUI Application. The Media Server conveys speech objects to the Telephony Server according to the process flow of the VUI Application. The Speech Recognition Server comprises hardware under program control to interpret the caller's vocalized navigation commands for the VUI Application. Thereafter the VUI Application translates the caller's uttered Service- content requests into database search expressions that are passed by the VUI

Speech Recognition Server, a Text-to-Speech Server, and a Media Server coupled to an Application Program Interface (API) of an independent Service-Database. The above mentioned components of the preferred embodiment are coupled together in a backbone network, and accordingly, each of the above components includes a network interface comprising hardware under program control to enable transceiving communications between the network components. The presently preferred backbone network comprises a TCP/IP network. Multiples of each of the above mentioned components can be incorporated together with a load-balancer for efficient handling of increased demand processing requirements.

A caller connects to the Telephony Server by dialing a telephone number associated with the Telephony Server by a Public Switched Telephone Network (PSTN). The Telephony Server includes a Telephone Network Interface for transceiving and managing phone calls received over a telephone network. Figure 1 depicts the Telephone Network Interface coupled to a Public Switched Telephone Network (PSTN) using T1 lines. The Telephone Network Interface further comprises speech signal processing hardware under program control for creating and outputting digitized speech-to-data streams and analog data-to-speech streams (collectively "speech-data-streams") that are conveyed to and from the Telephone Network Interface.

The VUI Application Server comprises hardware under control of a VUI Application. The VUI Application implements a vocally navigable Speech

Business Finder Speech Object.

Fig. C2 Depicts a conversational state diagram of an embodiment of a extended functionality of the Business Finder Speech Object.

Fig. D1 Depicts a conversational state diagram of an embodiment of a Stock Information Speech Object.

Fig. D2 Depicts a conversational state diagram of an embodiment of extended functionality of a Stock Information Speech Object.

Fig. D3 Depicts a conversational state diagram of an embodiment of extended functionality of a Stock Information Speech Object.

Fig. E1 Depicts a conversational state diagram of an embodiment of a Weather Speech Object.

Fig. E2 Depicts a conversational state diagram of an embodiment of a List Speech Object for conveying weather information to the caller.

Fig. F1 Depicts a conversational state diagram of an embodiment of a Address Locating Speech Object.

Fig. F2 Depicts a conversational state diagram of an embodiment of a Address Disambiguation Speech Object.

Fig. G1 Depicts a conversational state diagram of an embodiment of a Flight Finder Speech Object.

Fig. G2 Depicts a conversational state diagram of an embodiment of a Flight Information Speech Object.

Fig. G3 Depicts a conversational state diagram of an embodiment of a Itinerary Speech Object.

Fig. H Depicts a conversational state diagram of an embodiment of a Driving Directions Speech Object.

Description of Preferred Embodiments

The preferred embodiment of the present invention is implemented in a scaleable system architecture that includes at least one each of the following; a Vocal User Interface (VUI) Application Server, a Telephony Server, a

be invoked to define the invention(s), the claims will specifically state the phrases "means for" or "step for" and a function, without also reciting in such phrases any structure, material, or act in support of the function. Even when the claims recite a "means for" or "step for" performing a function, if they also recite any structure, material or acts in support of that means of step, then the intention is not to invoke the provisions of 35 U.S.C. §112, paragraph 6. Moreover, even if the provisions of 35 U.S.C. §112, paragraph 6, are invoked to define the inventions, it is intended that the inventions not be limited only to the specific structure, material or acts that are described in the preferred embodiments, but in addition, include any and all structures, materials or acts that perform the claimed function, along with any and all known or later-developed equivalent structures, materials or acts for performing the claimed function.

Brief Description of the Drawings

Fig. A1 Depicts a conversational state diagram of an embodiment of a Main Menu Speech Object.

Fig. A2 Depicts a conversational state diagram of an embodiment of a Login Speech Object.

Fig. A3 Depicts a conversational state diagram of an embodiment of a New Account Speech Object.

Fig. A4 Depicts a conversational state diagram of an embodiment of a Passcode Speech Object.

Fig. B1 Depicts a conversational state diagram of an embodiment of a Traffic Condition Speech Object.

Fig. B2 Depicts a conversational state diagram of an alternate embodiment of a Traffic Condition Speech Object.

Fig. C1 Depicts a conversational state diagram of an embodiment of a

there is need for user friendly VUIs that will increase the likelihood that callers will take advantage of the services.

Summary of the Invention

The present invention comprises a VUI Speech Object Application comprised of program module speech objects that interface with the APIs of service-databases to retrieve a caller's desired information. Moreover, inferential and educated decisions are made regarding a caller's desired information to enable a more caller friendly experience with the VUI Speech Object Application.

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its structure and its operation together with the additional object and advantages thereof will best be understood from the following description of the preferred embodiment of the present invention when read in conjunction with the accompanying drawings. Unless specifically noted, it is intended that the words and phrases in the specification and claims be given the ordinary and accustomed meaning to those of ordinary skill in the applicable art or arts. If any other meaning is intended, the specification will specifically state that a special meaning is being applied to a word or phrase. Likewise, the use of the words "function" or "means" in the Description of Preferred Embodiments is not intended to indicate a desire to invoke the special provision of 35 U.S.C. §112, paragraph 6 to define the invention. To the contrary, if the provisions of 35 U.S.C. §112, paragraph 6, are sought to

VOCAL INTERFACE SYSTEM AND METHOD

Field of the Invention

The present invention relates to the field of methods for enabling a caller to vocally access and retrieve information over a computer network.

Background

Customers have come to rely on and expect the quick availability of information from their merchants. Accordingly, merchants have devised methods of allowing their customers to have easy access to information about their products and services. The retrieval of information via merchant Internet Web pages, has for example, experienced explosive growth. Moreover, the development of practical speech recognition hardware and software has now made it possible to allow customers to access merchant information with a vocal user interface (VUI).

To date however, the development of effective or even tolerable VUIs has lagged the development of the technology to implement VUIs. This is the case because much of the communication between people in a typical conversation is nonverbal. This is particularly true when one individual is attempting to ascertain a specific item of information from the other. These conversations, when effective, are heavily influenced by educated and context dependent inferential answers and prompts for more information to aid in pinpointing the particular information of interest. When these elements are missing from the conversation, VUI implementations tend to be cumbersome and unpleasant to use, and accordingly, frustrating to users. Accordingly,

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